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F-106 DELTA DART in Action

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F-106 DELTA DART in Action

by Captain DON CARSON
and LOU DRENDEL

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INTRODUCTION . . . .

The **F-106 Delta Dart** is a remarkable, if relatively unheralded airplane. If its performance by present-day standards is less than amazing, its longevity certainly is, for the first F-106 rolled off the production line in 1956. Today, eighteen years later, the Dart is still flying, and is the only manned fighter-interceptor on active duty with the Aerospace Defense Command.

The idea for the **F-106** was originally conceived by the USAF Board of Senior Officers, in October, 1948. The Board had been studying the need for a new air defense fighter, and had concluded that, given the then current state of the art, the new fighter would have to be developed in two phases. The first model of **"The 1954 Interceptor"** (as the F-106 was originally called) was the **F-102A**, and was dubbed **"the Interim Fighter"**. It was scheduled to go into service in 1956.

The F-102 and the F-106 were to have been developed concurrently, but as the tensions of the cold war increased the need for an operational interceptor, the development of the advanced 106 suffered, as more effort was put into getting the 102 into the air. Delays in the F-106 program were caused by the J-75 engine and the revolutionary MA-1 fire control system, so the first flight of the "Six" did not take place until January of 1957. On its maiden flight the Dart attained a speed of Mach 1.9, and an altitude of 57,000 feet. The final version of "The 1954 Interceptor" was still far from a finished product. Due to the lag in development and testing, numerous changes were made to the aircraft after it was in production. (In 1960 alone, there were 63 changes to the fire control system, and 67 changes to the airframe.)

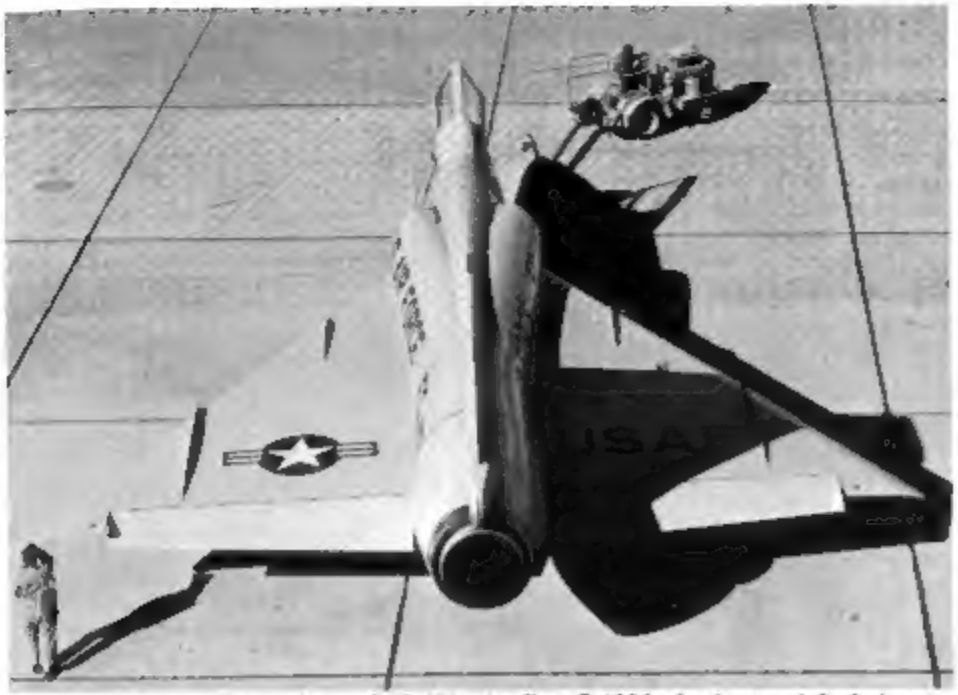
By 1962, ADC possessed 251 F-106A interceptors, assigned to 14 squadrons. A total of 277 **F-106A** and 63 **F-106B** models were built between 1956 and 1959. The A and B models are both capable of performing the air defense mission and have almost identical performance figures. The major difference in the two is the dual seating arrangement of the "B".

The first completely operational F-106 squadron was the 498th FIS, stationed at Geiger Field, near Spokane, Washington. The "Geiger Tigers" became operational with the F-106 in May, 1959. Today there are seven active duty, and three Air National Guard squadrons flying the F-106.

The F-106 overcame its early production problems and developed into the premier all-weather fighter interceptor. Throughout its life the "Six" has received numerous changes to the fire control system and avionics. (The original versions contained nearly 2800 lbs. of equipment in the MA-1 fire control system alone!) Recent changes have included improved radar systems, solid state tacan and UHF radio, a one piece bubble canopy, and modifications to include a 20mm gun and "snap shoot" gunsight. The addition of solid state components has eased maintenance and resulted in some weight savings in the "black boxes" of the "Six". Other significant changes to the F-106 have included a Infrared Seeker system and various electronic countermeasure features to the radar.

Since the 1967 modification to permit aerial refueling of the "Six", it has been deployed to Korea and Labrador in support of world wide air defense requirements. When the Dart got the world-wide capability, the ADC realized that 106 pilots would have to be prepared to operate in areas of hostile fighter threats. Accordingly, in the late 60's, a program to train 106 pilots in air combat tactics (ACT) was instituted. The F-106 proved to have an excellent capability as an air-to-air fighter. Its large wing and high thrust enabled the 106 to outperform almost any airplane in the operational inventory. But ACT also showed that the "Six" needed a gun to back up its radar and infrared missiles, and the Air Defense Weapons Center began testing an F-106 with a gun mounted in its weapons bay. These tests were very successful, and a modification enabling all F-106A's to mount the 20mm Vulcan cannon has been approved.

After 18 years of service, the Delta Dart is still a formidable weapon, capable of speeds in excess of Mach 2. Continuing modifications and improvements have kept the F-106 abreast of the latest technology, and it will continue to serve as the front-line interceptor of the Aerospace Defense Command until a new interceptor system enters the Air Force inventory.



Three views of 56-451, the first *F-106A*. At the top left, being towed from parking spot. The "coke bottle" shape of the fuselage is most evident in this picture. This is a design feature which enables the 106 to attain higher speeds. At bottom taxiing out for a test flight from Edwards AFB. Note the wing fences, which were later eliminated. At top right as it appears today, on display at the USAF Museum. Note that at some point in its operational career 451 was fitted with the fenceless wings, though not the air refueling mod, or the infrared sensor. (U.S.A.F. and Jim Sullivan)

Number 2 *F-106* leaves the Convair plant for an early test flight. (Convair)

The number 11 *F-106A*, still sporting factory colors, on display at Andrews AFB, in 1958. (Robert T. O'Dell)

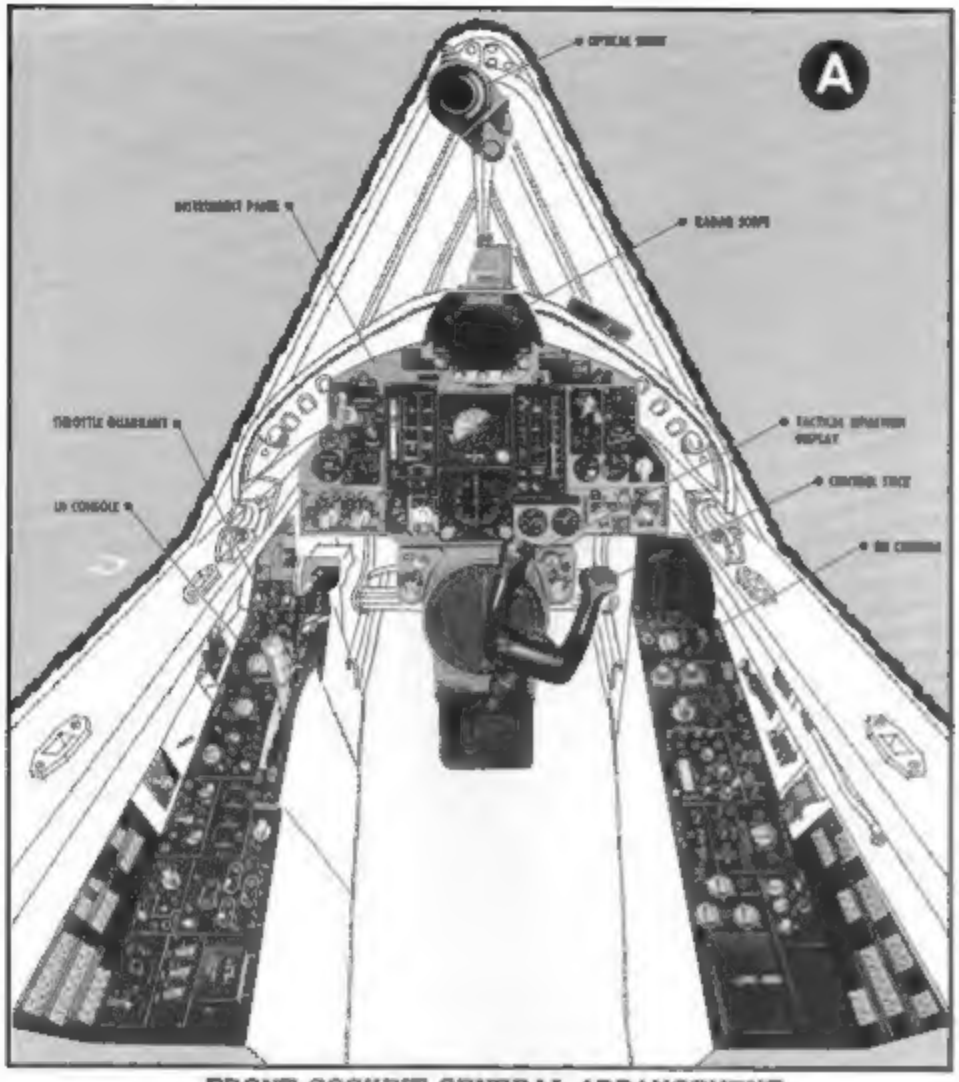
Two seat *F-106B* in test colors at the Convair factory. "B" model was a follow-up to the "A" and is used for training and flight checks. It retains full weapons employment capability and can be used as an interceptor as well as a trainer. (Convair)

453, sans vision splitter, during tests at Edwards AFB. (Convair)

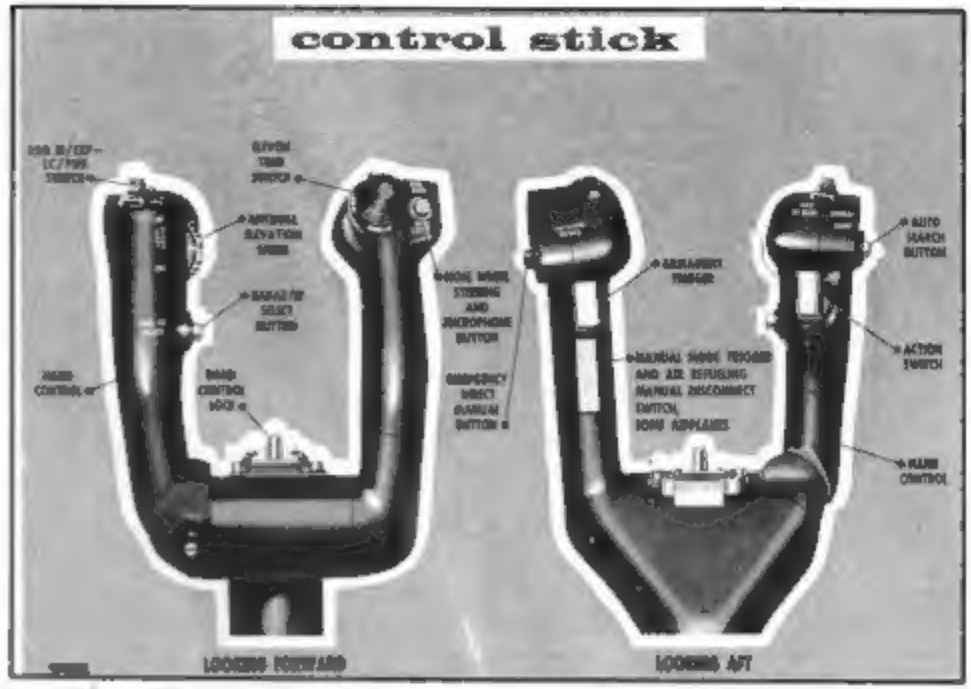
F-106B with the weapons bay doors open and one *Falcon Weapons System Evaluator Missile* extended. These missiles are dummies which track the target, but do not leave the aircraft. They are used to evaluate the aircraft fire control system. Evaluator missiles are painted blue, while the real Falcon missiles are red and white. (USAF)

The larger and heavier canopy of the *F-106B* is supported by two canopy braces (painted red) when the aircraft is parked. (Lou Drendel)

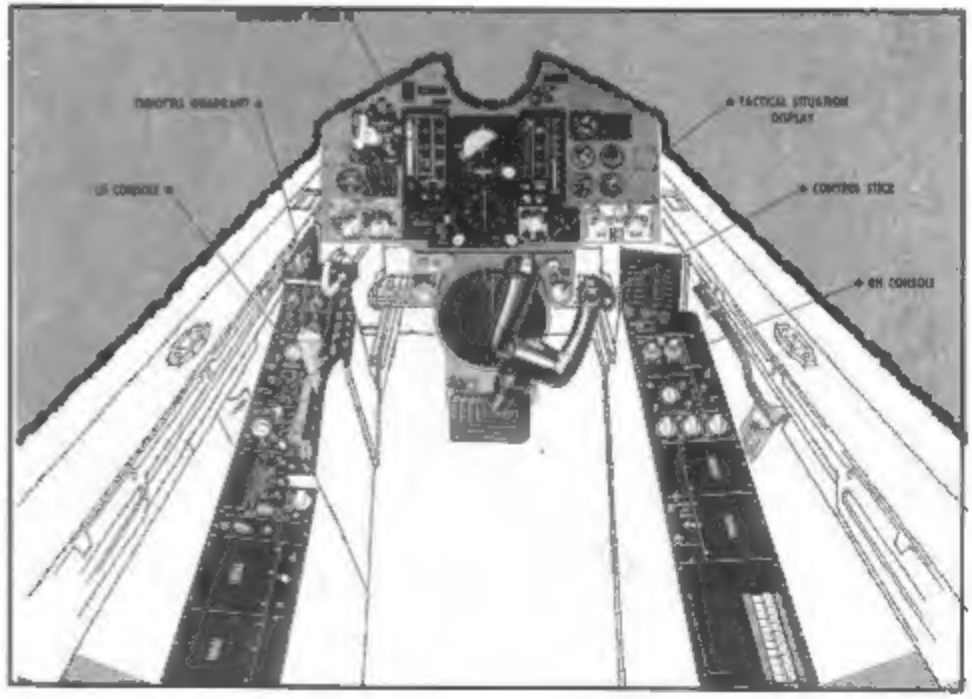
The *F-106* uses a single point refueling system. The fuel hose pumps fuel under pressure to all fuel tanks in the wing, fuselage, and external tanks. (USAF)



FRONT COCKPIT GENERAL ARRANGEMENT

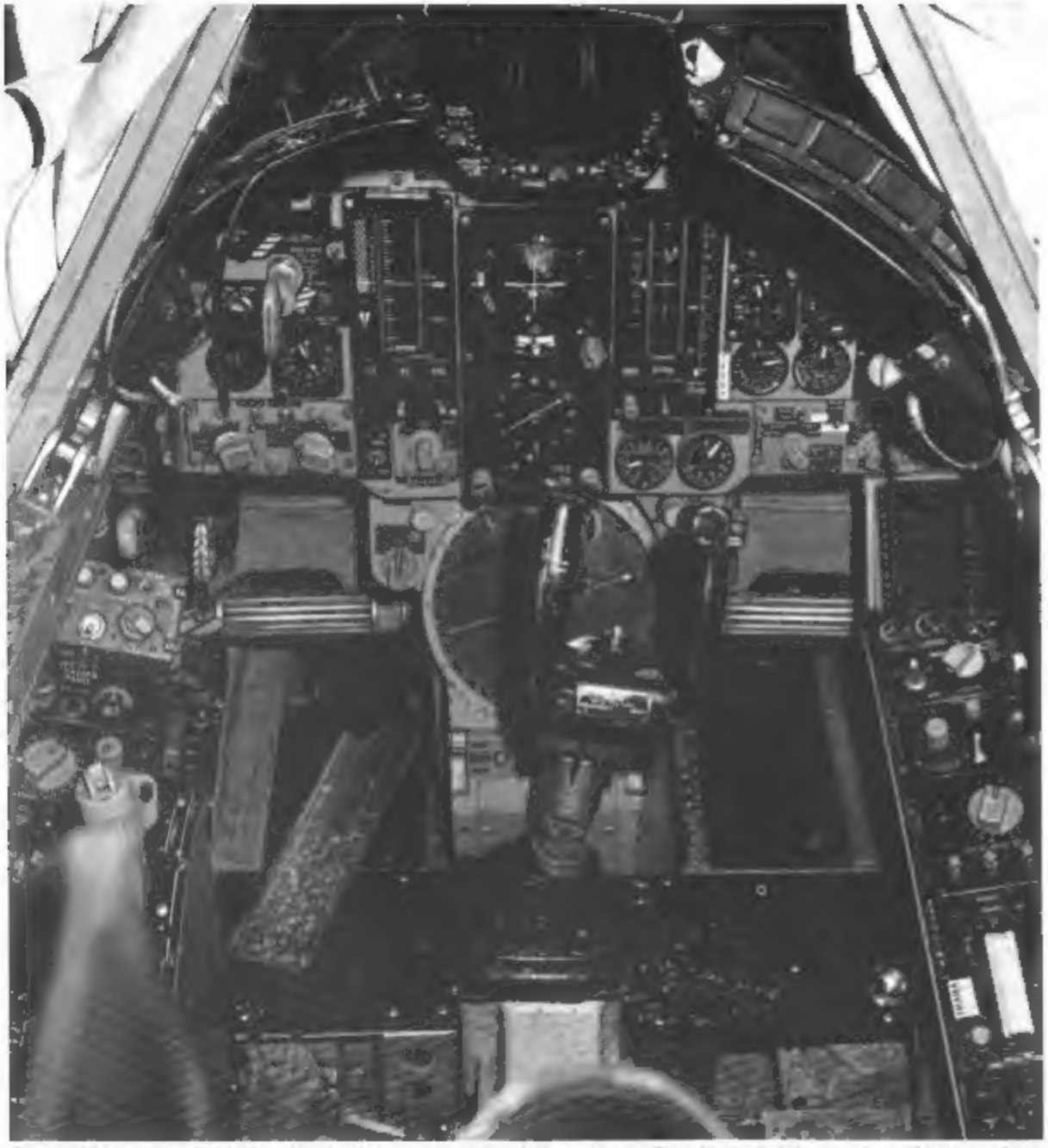


(Above right) CONTROL STICK



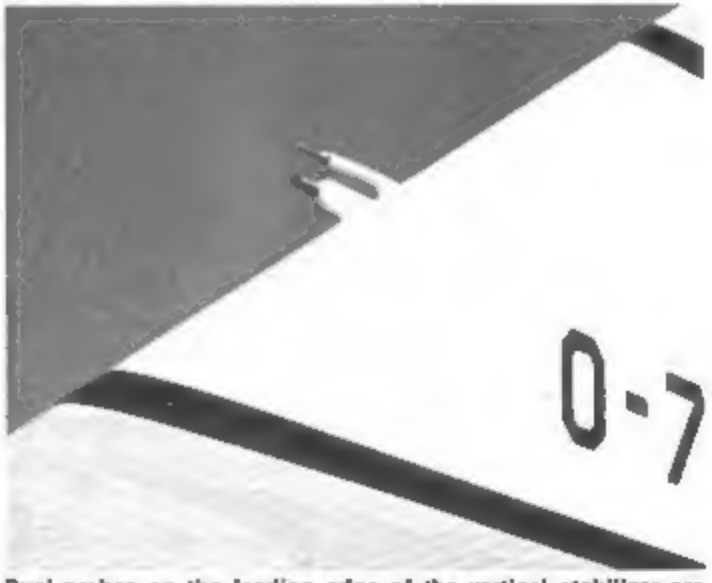
REAR COCKPIT GENERAL ARRANGEMENT

Detailed view of the rear end of the Six, showing to good advantage the engine exhaust with afterburner eyelids closed. Speed brakes are open, and the drag chute assembly is visible, with packed chute immediately under the rudder. The tail hook mod was added to all Sixes beginning in May, 1963. (USAF)

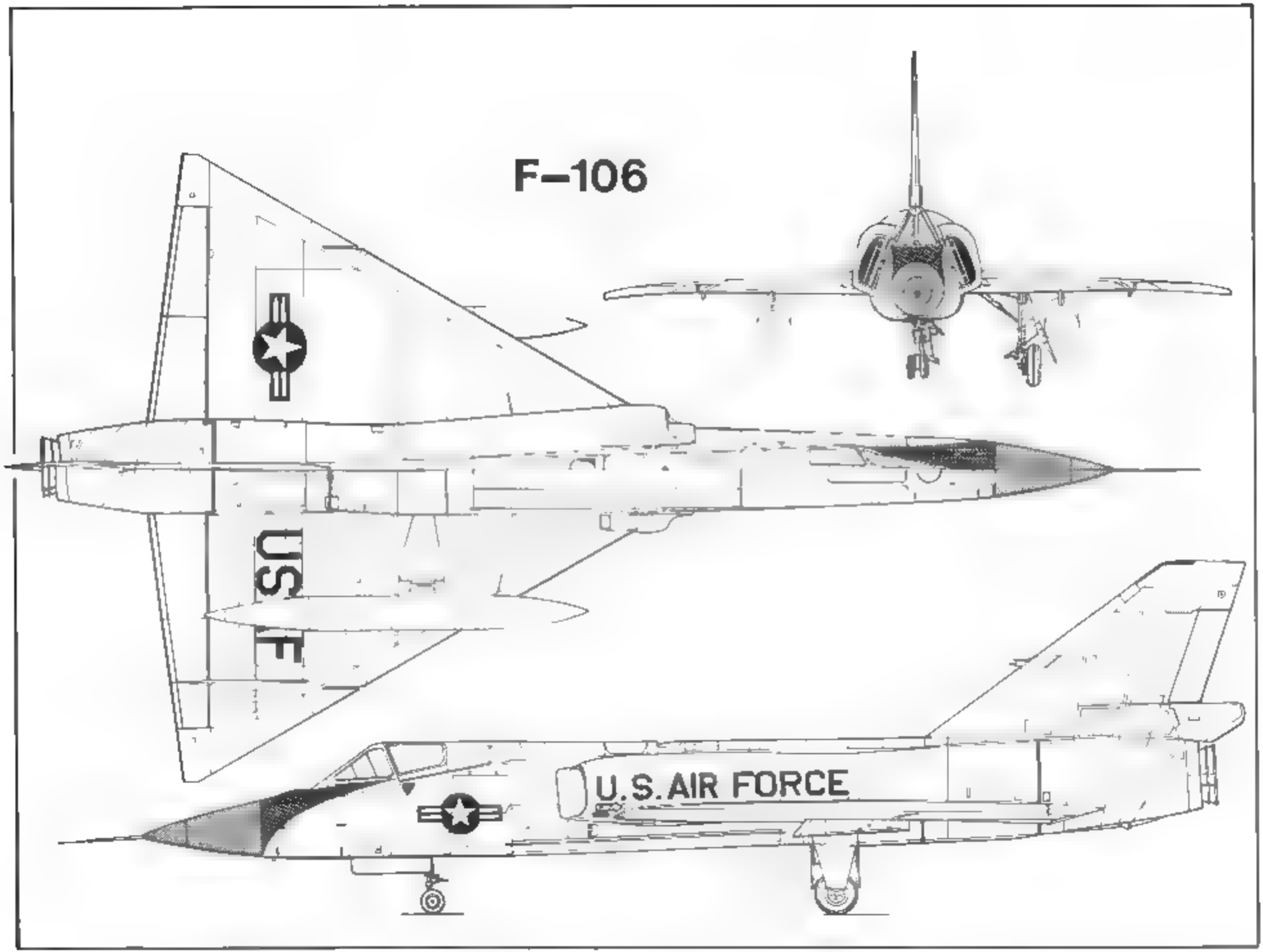


Front office of the *F-106A*, with the later, tape type, instruments. The dual stick is a unique feature of the Six, and is used for flying and operating the radar. (USAF)

The Tactical Situation Display, which is at the bottom of the 106 instrument panel. Symbols on the map representing the interceptor and target move and remain in relative position to their location over the ground. (USAF)



Dual probes on the leading edge of the vertical stabilizer are air intakes for the rudder feel system of the flight controls. (Norman E. Taylor)


F-106
U.S. AIR FORCE

Flying the "SIX"

The following article first appeared in the October, 1973 issue of AIR FORCE Magazine. It is reprinted here with the permission of the editors of AIR FORCE Magazine.

Capt. Don Carson climbs up the ladder during an air defense scramble at Homestead AFB Fla. 1972 (USAF)

How does an aircraft perform after fifteen years of hard use? The men who fly the **F-106 Delta Dart** think it has improved with age. Many say the **"Six"** is one of the truly great airframe designs of modern aviation. The 'Six' can perform its mission far better today than it could when introduced in 1959 because the systems have been continually refined.

The physical beauty of the F-106 is immediately apparent. Its sleek fuselage and its tall, sweptback tail give an indication of the aircraft's great speed. The F-106 established several altitude records, and in 1959, set a world's official speed record of 1,525.9 mph, which is impressive even today. The F-106 has been the first-line interceptor of ADC and NORAD since 1959.

To give you an idea of what it is like to fly the F-106, let me take you along on two typical training missions. The first demonstrates its abilities as an interceptor. The second shows its potential in aerial combat.

Externally, the "Six" has remained basically unchanged from its beginning and has not been fattened with the added weight and drag of "bolt on modifications," which so often plague fighter aircraft with sloth-like performance as they grow older.

Our walk-around inspection starts with the lance-like pitot tube at the very front of the aircraft. This provides an air pressure input for the central air data computer (CADC), which in turn provides accurate airspeed and altitude information to the flight instruments and main aircraft computer.

Behind the pitot tube is the large black conical radome — the nose of the aircraft. Housed here are the radar antenna and a nose full of "magic black boxes" to power the radar, infrared (IR), and the fire-control systems.

The huge delta wing is the most prominent feature of the F-106 A delta-winged aircraft is unique It has no horizontal stabilizer or elevators The movable portion of the wings serve as both elevator and aileron and are appropriately called "elevons" The elevons operate differentially (in opposite directions) to produce roll and together for pitch control A delta-wing aircraft feels much the same as any conventionally designed aircraft during flight Its advantages are its excellent performance at high altitudes and an agile turning ability at lower and medium altitudes

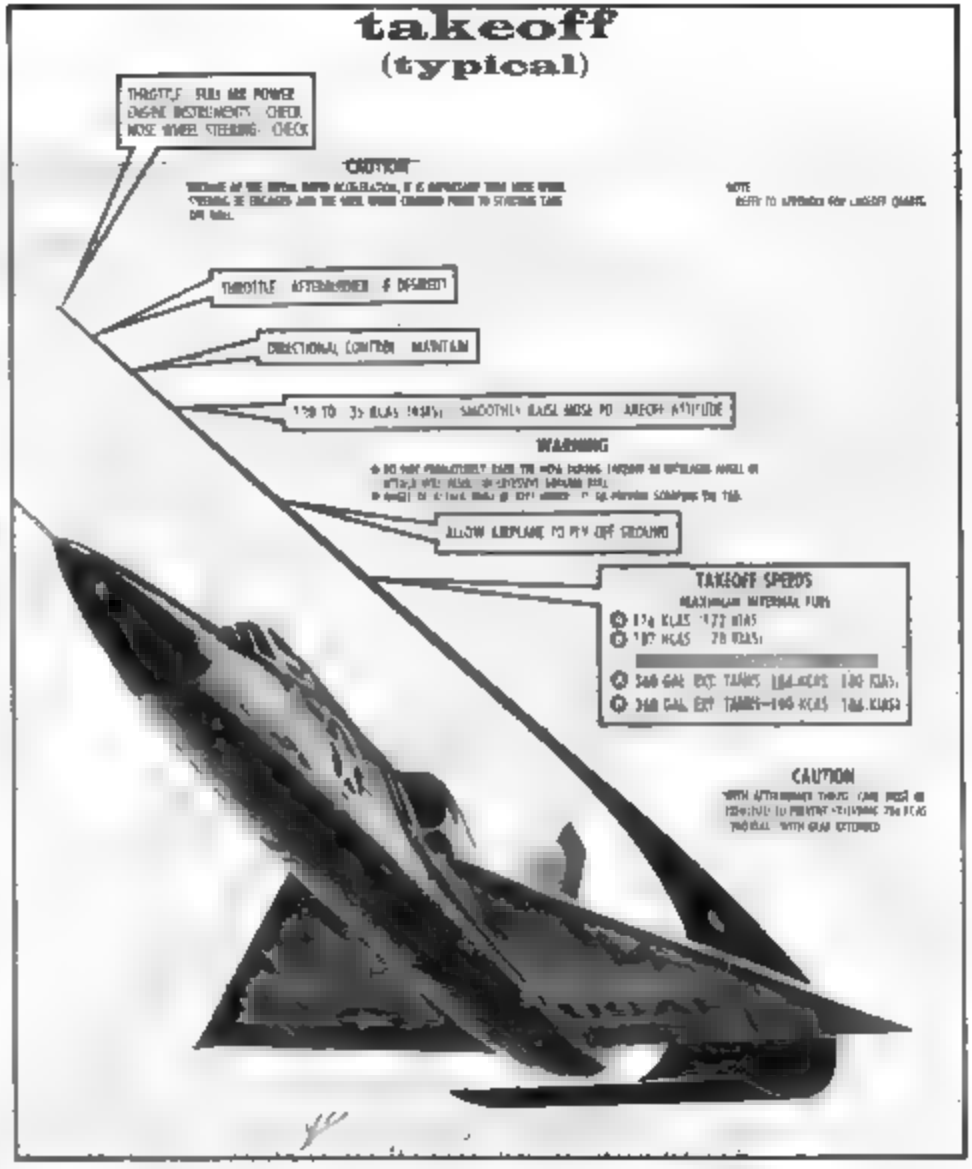
The very large wing enables the "Six" to cruise efficiently at high subsonic and supersonic speeds The aircraft's cruise performance can be even greater when external fuel tanks are removed

Passing under the wing we continue the inspection, stopping to open the missile bay to inspect our weapons load Today, we'll be firing live AIM-4 Falcon missiles on the air-to-air range over the Gulf of Mexico, near Tyndall AFB, Fla A full weapons load consists of two IR and two radar-guided missiles and an AIR-2A Genie rocket Today's firing load is two AIM-4F radar missiles The three types of air-to-air weapons give the F-106 an excellent capability against either manned bombers or maneuvering fighters at both high and low altitudes. All armament is carried internally

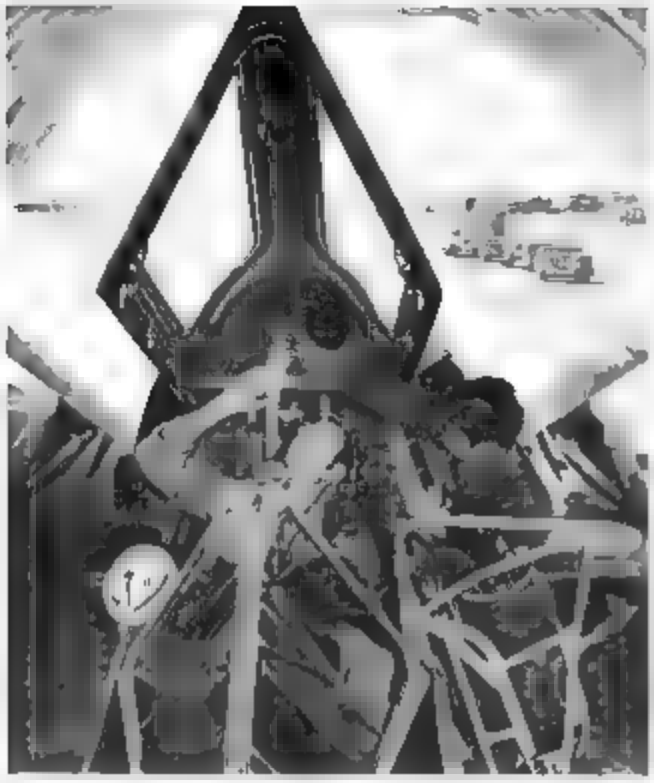
Gauges and Gadgets

Our exterior inspection complete, we climb the ladder into the cockpit Our first check is the vertical tape instruments which are used instead of conventional round gauges Once you've flown a "taped" bird, you are forever spoiled Tapes present all necessary information in such a clear manner that it is almost impossible to misread altitude or airspeed

Centered above the aircraft instruments is a special "daylight" radarscope The scope background is a bright green with white target returns, easily visible in broad daylight Older scopes needed a hood to shade them or else the pilot had to lean forward to see the scope displays Flying with your head in a radarscope while trying to conduct a low-altitude intercept is not the way to gain another cluster for your longevity ribbon



A unique feature of the "Six" is the "annunciator" for the armament, computer, and navigation systems A small, round indicator window tells the status of each system There is never any doubt as to whether they are operating or not.



Don Carson gets a helping hand from his crew chief, while strapping into a Six at Homestead AFB (USAF)

On the lower pedestal, between my feet, is one of the most remarkable pieces of navigation equipment ever put into a fighter — the Tactical Situation Display (TSD). It resembles a TV screen and shows a map corresponding to the TACAN navigation station I've selected. A triangle, called the interceptor symbol, which represents my aircraft, is positioned over this map at our exact location. The advantages of this versatile system become evident especially during a night weather penetration.

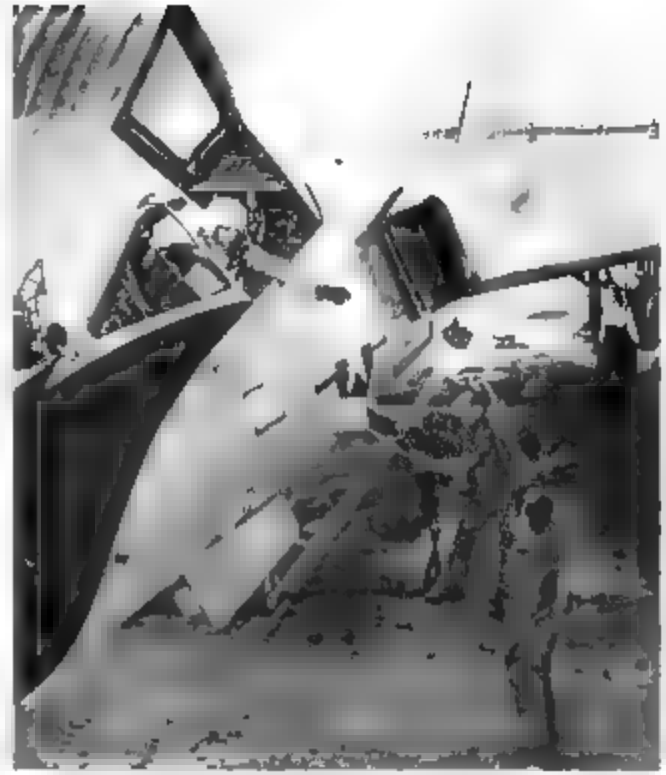
After we're strapped in, I depress the engine ignition button and move the throttle outboard and then back in to fire the starter motor and provide ignition. The engine can be started without external power by using internally stored high-pressure air and aircraft battery. This enables the F-106 to operate from dispersed airfields with a minimum of support.

Once started, I turn on the single MA-1 fire-control power switch, which operates all of the weapons, radar, computer, navigation, and communication equipment. I dial in a grid reference setting to tell my computer the location and aircraft heading. The aircraft computer has tremendous capabilities, and one of them is dead-reckoning navigation. Once the grid reference setting has been inserted, I can fly to any predetermined fix on my TSD without receiving information from a TACAN station or any other type of navigation aid.

Ready to Roll

I close the canopy and taxi to the runway. Everything looks good, so I "hack" the clock, release the brakes, and put the throttle in afterburner. Suddenly, everything gets quiet for a moment as the EPR drops while the engine eyelids open. I'm jolted forward by a solid kick in the back and a loud bang as I get the "hard light" so characteristic of the J75 engine. This is the same engine found in the F-105, making the "Thud" and "Six" the two most powerful single-engine aircraft in the world. The J75 puts out 24,500 pounds of thrust in full afterburner (26,500 for the F-105 during a water-injection takeoff.) The hard light is even more apparent than in the F-105, as the "Six" is several tons lighter.

Acceleration is extremely rapid. I ease back



and signals him to disconnect electric power, as he prepares to taxi. (USAF)

on the stick at 135 knots to raise the nosewheels off the runway. Holding this takeoff attitude, the aircraft flies off the runway at 184 knots. At 250 knots, I come out of afterburner long before crossing the end of the runway. Moving almost 42,000 pounds from a standing start to more than 250 knots in about 7,000 feet is quite impressive. The F-106 is a thrill to fly, and the novelty never wears off. I accelerate out to 400 knots and begin to climb at a steeper rate, maintaining this speed until reaching Mach .93, which I hold to level off. I kick my rudders to fishtail the aircraft — a signal to my wingmen that I want them to

move out into route formation.

After contacting the ground-controlled intercept (GCI) director who will control the mission, I separate my flight. Each aircraft begins to follow the "Data Link" commands sent from the intercept director. Under Data Link direction, the computer at the Semi-Automatic Ground Environment (SAGE) or Backup Interceptor Control (BUIC) center transmits information to each aircraft. The MA-1 aircraft computer displays data as heading, airspeed, and altitude commands. I also receive target heading, speed, altitude, range, and bearing information.

Once I've checked in with my intercept director, giving my armament safety check, the remainder of the intercept can be conducted without either of us saying a word. I receive all commands on my "tapes" in the form of white markers that appear over the speed, altitude, and heading I'm to fly. There is also information displayed on the Tactical Situation Display (TSD) which depicts the entire intercept on my map display. I can see my position in relation to that of the target, and the type of intercept I'll be conducting. Today for range safety, I'll call my contact with the target and get verbal clearance to fire from my GCI controller.

When the target-marker indicator moves up on the altitude tape, and I begin to receive target range, I know I've been committed against a specific target. At this time I arm my missiles.

I search the sector of my radarscope that corresponds to the target bearing and distance being sent by the Data Link. I position my radar antenna elevation to search the altitude at which my target is flying. Today, I'll be directed to make a 10,000-foot front "snap-up" attack against a Firebee drone target flying at 40,000 feet.

Scratch One Drone

I'm turning toward the drone, which is now thirty miles ahead, coming directly at me. I select afterburner to gain speed for the snap-up. The snap-up maneuver is used against targets at very high altitudes. This drone will not be above 45,000, but I'll still use a snap-up since it is a more demanding intercept and provides very realistic training. The afterburner quickly pushes me through the transonic area into supersonic flight. There's no difference in the feel of the aircraft as it goes supersonic. Your only indication is a slight movement in the altitude tape, which quickly settles back down to normal.

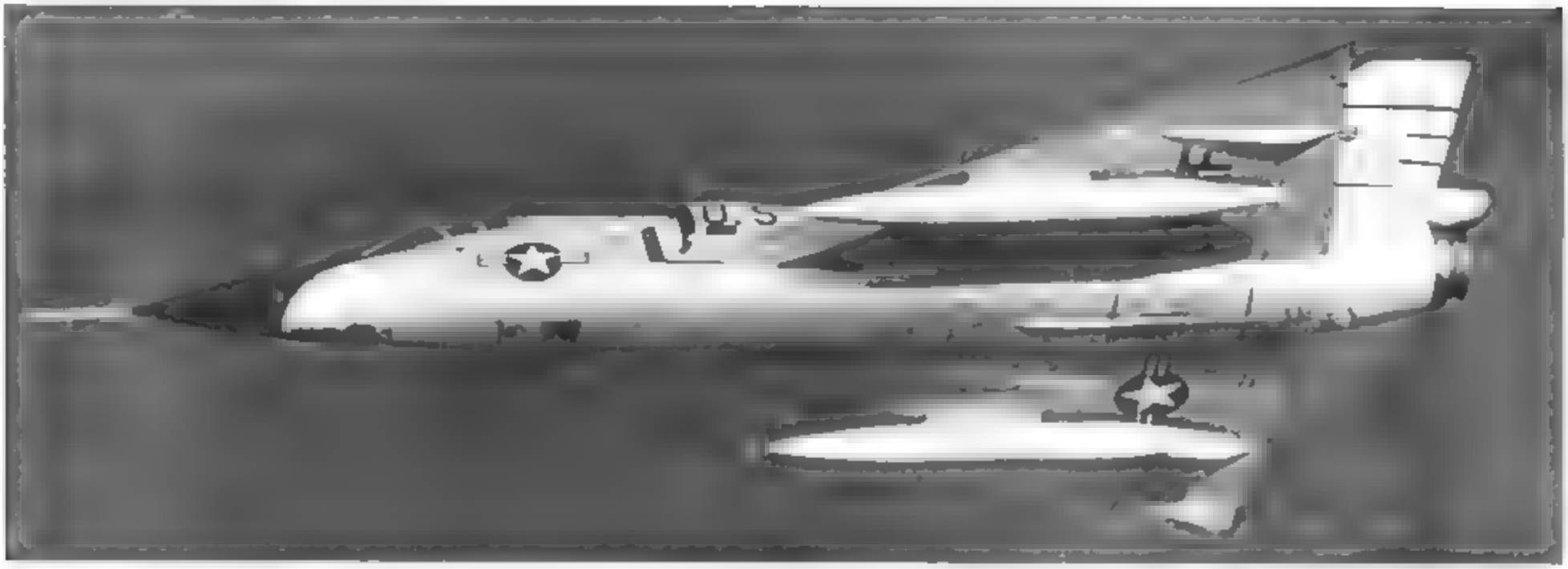
I spot my target five degrees left at the top of my scope and call a "contact." Grasping the left half of the "split stick" which controls both the aircraft and the radar system, I'm positioning the antenna beam and "range gate" over the radar return. The radar locks on. "Red Lead...Judy," I call to the GCI controller to indicate I'm assuming full control of the intercept.

The MA-1 computer now takes over and computes the intercept steering geometry. I can either select the "auto-attack" mode which will take the computer inputs and steer me to the target, or fly it manually. The autopilot doesn't need the practice. I'm turning to center the steering dot depicted on the radar attack displays. The target is moving rapidly down the scope. I'm selecting the expanded sixteen-mile radarscope display which gives more precise information.

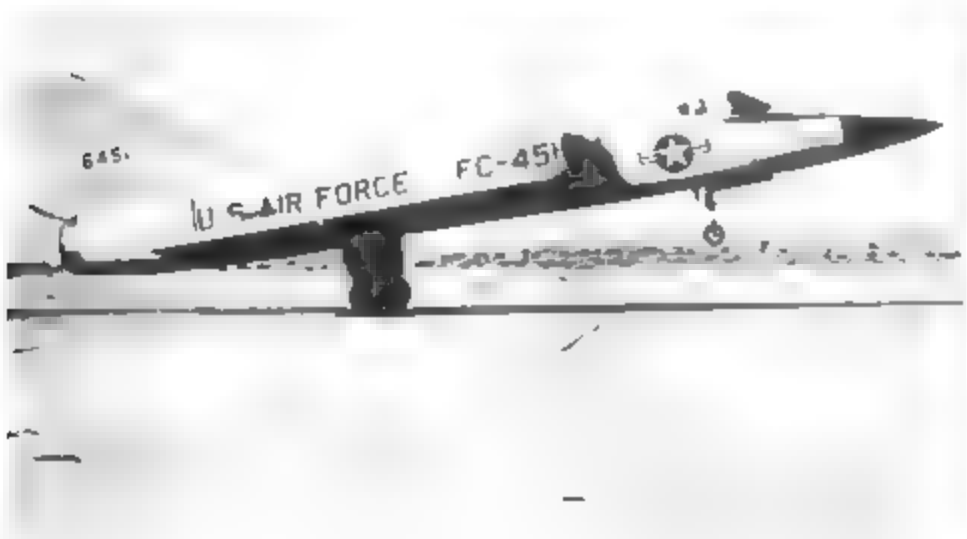
At approximately fourteen miles, the scope tells me it's time to begin the snap-up. I'm smoothly pulling the nose above the horizon into a steep climb as the outer radar range circle on the radarscope begins to shrink. When this circle shrinks to the same size as the smaller steering circle, the missiles will fire. A steering dot and another smaller circle on the scope provide directional information. The aircraft is turned to put the dot in the hole, thus positioning the aircraft for an accurate missile launch. Looking up, I see the drone dead ahead and well above me. Squeeze the trigger. Wait for the computer to fire the missiles at the correct moment. The steering dot is "pegged" directly in the center of the steering circle. When the fire signal appears on the scope, there's a loud rush of air as the weapons bay doors rapidly slam open.

Now a roar as two Hughes Falcon missiles accelerate away from me as if I were sitting still. They're heading toward the drone with a closure rate almost three times the speed of sound. It's a hit.

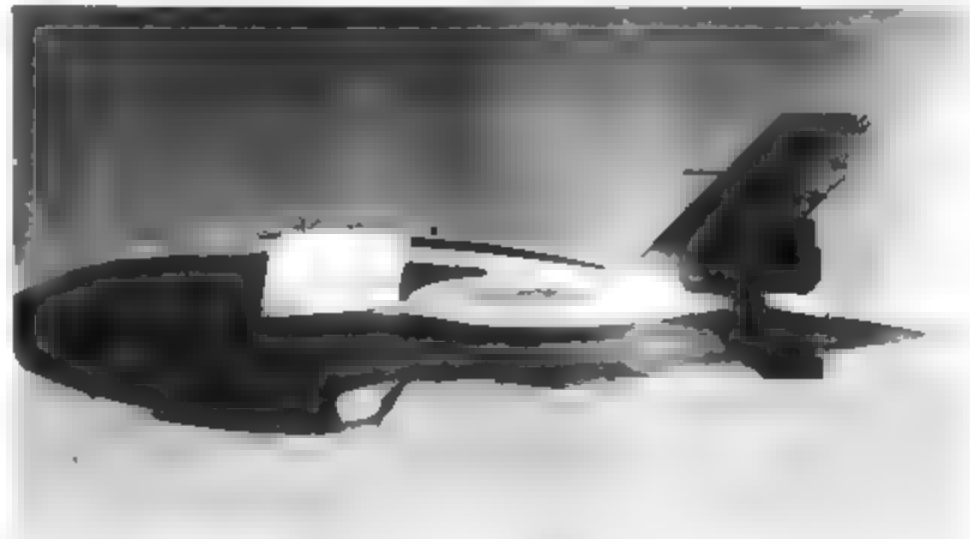
My fascination is interrupted by the jolting realization that I must execute my breakaway maneuver to avoid flying through the debris of the target. I begin following the Data Link commands for RTB (return to base). I look down and follow the parachute attached to the crippled drone, now thousands of feet below, slowing falling into the Gulf of Mexico.



F-106A of the 48th FIS during a low attitude scramble over the Florida Keys in 1972 (Capt Don Carson)



Early *F-106* demonstrates aerodynamic braking attitude. (Elmer Ressland)



Q2 *"Firebee"* drone target. Manufactured by the Ryan Aircraft Company, the *"Firebee"* flys at a speed of 75 mach. (Elmer Ressland)

Back in the airfield traffic pattern, I'm reminded of one disadvantage of the delta wing - the absence of wing flaps This causes the 'Six' to have relatively high final approach and landing speeds A normal weight final approach (2,000 pounds of fuel remaining) is flown at 181 knots, with touchdown at 149 knots. Landing speeds can exceed 200 knots on final with a heavy fuel load on board However, the drag chute and high drag generated by the delta wing during aerodynamic braking enable you to stop the F-106 in very short distances Aerodynamic braking is accomplished by slowly raising the nose of the aircraft — up to a maximum of seventeen degrees — once your main landing gear have touched the runway It gives you the feeling that you're going to topple over backwards

All F-106 live armament firings are done on the Tyndall AFB ranges under the direction of the Air Defense Weapons Center Each F-106 squadron deploys to Florida annually for at least a week of weapons firing Daily training missions are flown against high- and low-altitudes targets, using chaff and electronic countermeasures (ECM) The chaff and ECM emitted by target aircraft test the anti-jamming capabilities of the F-106 which are second to no other interceptor flying Countering the ECM of a well-equipped bomber is beyond the ability of most fighters, but not the F-106 There is almost always a way for the "Six" to get an "MA" (mission accomplished) or a kill.

The Other Role: Air-Superiority Fighter

The aerial-refueling modification added in the late 1960s gave the F-106 unlimited range and the ability to respond to emergencies anywhere in the world In 1968, F-106's were flown across the Pacific to Korea in response to the North Korean seizure of the USS **Pueblo.** This worldwide capability increased the possibility that the F-106 will come in contact with enemy fighters To prepare for this contingency, all F-106 pilots are given extensive training in air combat tactics (ACT), a mission at which the "Six" excels.

To demonstrate what it's like to fly an F-106 during an ACT engagement, I'd like to now take you to the 48th Fighter-Interceptor Squadron at Langley AFB, Va. where you will observe a mission flown against a flight of Navy fighters from Oceana Naval Air Station, Va Much of the ACT training in the F-106 is conducted against different types of fighters, to obtain more realistic training and expose the pilots to the tactics of others

As I lead my flight of two into the ACT training area just west of Cape Hatteras, N C., I check in and wait for the Navy flight to come up on my frequency I usually arrive in the training area first since the F-106 normally flies with external fuel tanks and has approximately forty minutes more fuel than the Navy fighters, which fly without external tanks

I set up an orbit at the western edge of the training area and spread my wingman out into patrol formation The Navy flight checks in on my frequency — their call sign is 'Ripper" I answer, "Hello, Rippers This is Red One We are in an orbit over lake at twenty thousand "

Ripper lead answers, "Roger, Red we are heading east to the Cape " With one flight positioned over Cape Hatteras and the other over Lake Matamuskeet, we have a fifty-mile separation for the first setup.

"Red flight, vector, 120 degrees," directs the GCI controller "Ripper flight, go port to 300 degrees Ripper you will be the first bogey " You pick up the heading and push up the throttle to gain a little speed

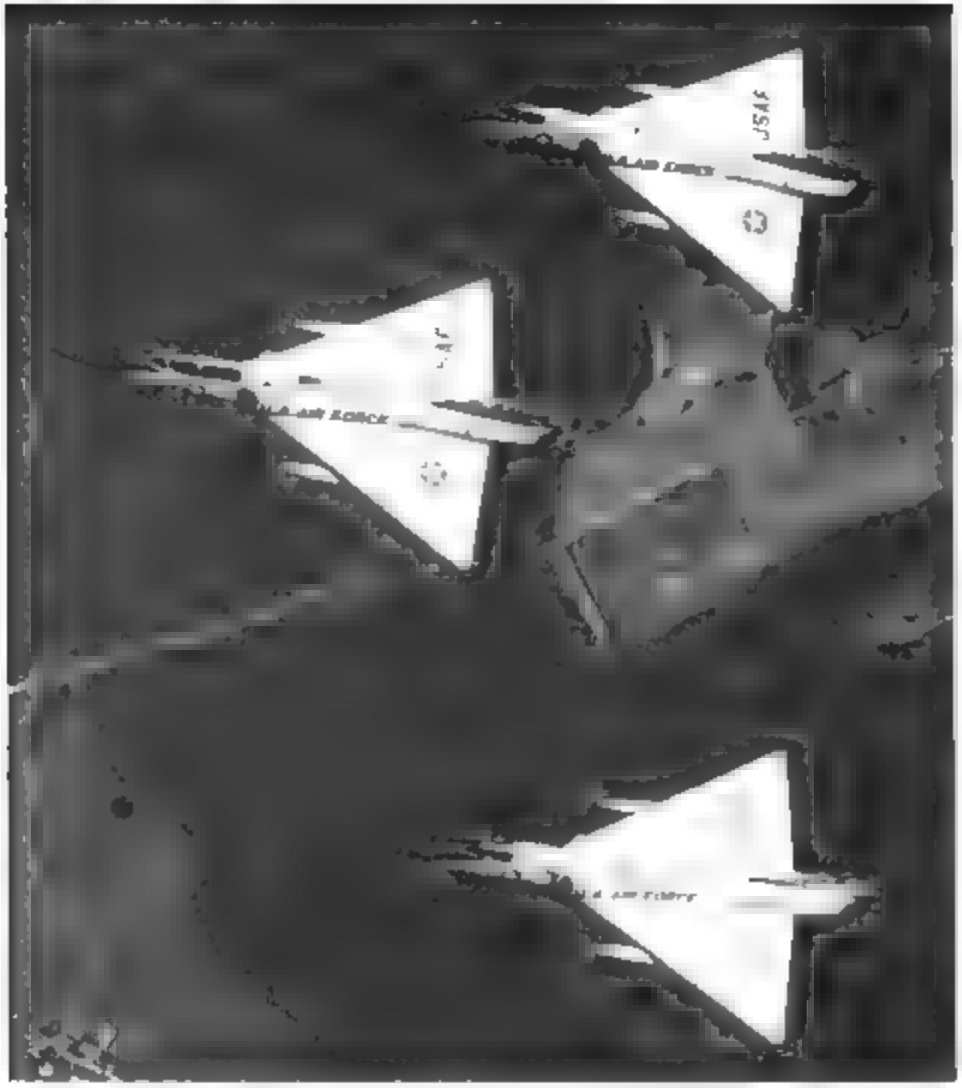
On an ACT mission, the initial setup is either "head on" or from the beam The flights alternate being the bogey (target flight) and the interceptor flight The flight acting as bogey will receive only one heading and altitude to fly until they obtain visual contact with the interceptors At this time they are free to manuever to defend or, if possible, take the offensive during an ensuing engagement The interceptor flight receives full GCI support and is vectored toward the bogeys under radar control

"Red flight is steady 120," I transmit

"Roger, Red.. target is five degrees right at thirty miles "

I pick up a radar blip five degrees right at about thirty miles on my scope and lock on to it The radarscope indicates 1,200-knot overtake on the bogeys I advise the GCI controller that we have a "Judy" (radar lock on)

"Go Gate," I call to my wingman to select afterburner The Mach tape rapidly climbs to 1 4 as we nose over to unload and let our



aircraft accelerate while maintaining zero G. By "unloading" and flying with less than one G the aircraft is free from the drag caused by producing lift with its wings. All engine thrust is now used to propel the aircraft forward, greatly increasing acceleration. The discomfort of hanging against the lap belt as you float under a lack of gravity is well worth the speed gained during the few moments of this maneuver. We are now closing at almost 2,000 miles per hour. Turning into their beam, we visually pick up two F-4's at eight miles.

I call, "Tally ho! . . . twelve o'clock . . . about 5,000 feet high." My wingman answers that he's got them in sight too. The bogeys are flying straight ahead, so we know that they haven't spotted us as we slide into their stern at four miles, closing quickly.

The bogeys see us and suddenly begin a defensive turn into us. As we close, the Navy flight is still in a turn when they call their "split." Ripper lead dives in afterburner to pick up speed and keep us out of range. His wingman climbs to gain separation and cover the leader. If we follow his leader, the wingman will be in a good position to come in from behind and sandwich us between them.

I decide to drive the low man out of the fight and then double-team the high man. "Red, let's take the low man," I call to my wingman, as I head down after Ripper lead. Ripper leader sees us getting into good firing position and breaks into a very hard spiral to get us off his tail. I pull back on the stick. The G meter climbs to six G's, and the aircraft shudders slightly as I climb rapidly.

Two on One

"OK, Two. He is out of the fight for a while — let's take the high man," I call. When the low man "broke" he killed off his airspeed in order to make an extremely hard turn. This got him out of his immediate predicament, but also temporarily destroyed his ability to get back up into the fight to support his wingman, who stayed high. We had used our speed to climb back up to Ripper Two, rather than bleed it off in an attempt to turn with the leader.

Ripper Two is now three miles at our two o'clock and slightly high. This gives us a "two-on-one" situation, which was what we had pre-briefed to attain.

"Red Two, stay high — I'm going in on Ripper Two," I call to my wingman.

"Roger, lead," he answers.

I know from where Red Two is flying that he'll be able to cover my six o'clock during the attack. Ripper Two starts a turn into us. We pass almost head on with only a few hundred feet separating our aircraft. I start a steep climbing turn into him. We pass canopy to canopy. Every time I pass that close to an aircraft, I'm amazed at the sensation of speed you feel. The other aircraft is only a blur as you pass him at over 1,200 mph.

Ripper Two continues in a level turn as I climb rapidly almost straight up. As the airspeed begins to bleed off, I roll my aircraft on its back and hang inverted, watching our bogey still in his turn below. Putting in full left rudder and pulling back on the stick, I rapidly roll straight down behind Ripper Two, picking up the airspeed I had lost in the climb.

"Red One is sliding into Ripper Two's six-o'clock. Where is Ripper lead?" I ask my wingman.

My wingman answers, "He's low and still out of it. . . no threat. I'll keep him out of the fight."

The perspiration runs down into my eyes as I increase the G's to more than five to cut Ripper off in his turn. I move my left hand from the throttle over to the radar hand control. It's a struggle. G-forces always seem to add to the tension of a dogfight. This added weight requires that you exert an extra effort to make any movement. You're also squeezed tightly through your legs and stomach as your anti-G suit inflates to prevent all the blood from rushing to your legs.

Continuing to close on Ripper Two, I get an infrared head-up lock-on without looking into the radarscope. This is a great system. It enables an F-106 pilot to get a quick lock-on to a hard maneuvering target without taking his eyes from the fight. Moving closer, I squeeze the firing trigger at three-quarters of a mile and feel the weapons bay door open as the inert missiles are extended into the airstream and quickly retract after tracking the target.

"Red One. . . MA on Ripper Two." I transmit as I pull the throttle out of afterburner. Easing off the G's, I "roll off" and head away from Ripper Two. "Red is disengaging and heading toward the lake." I call. Looking right, I see my wingman still in excellent position. We head west to the lake to set up for another engagement. This time it will be our turn to be the bogeys and to be on the defensive.

Checking fuel, we both have 5,000 pounds remaining. Enough for two more engagements and the return trip home of more than 100 miles. It is now that the long legs of the F-106 become of value. You can get in a lot of good flying in the "Six" and still have plenty of fuel for the trip home.

The Future Is Bright

We're finally seeing long-overdue changes in the F-106. Many "Sixes" are now flying with a new clear bubble canopy that eliminates the great visibility problem presented by the old canopy. The F-106 fleet is also getting the composite boresight modification. This is the head-up lock-on capability mentioned earlier.

There will also be greatly increased reliability built into the MA-1 fire-control system as it is updated to increase its capabilities and accuracy. Many MA-1 components have already been converted to solid-state technology, replacing the older and less reliable equipment.

The present F-106 engine accessory drive and generator system is made up of four separate and independent generators. This will soon be replaced by the single multiphase F-111 generator. It has proved to be extremely reliable and will provide all F-106 electrical power, with a saving in total aircraft weight.

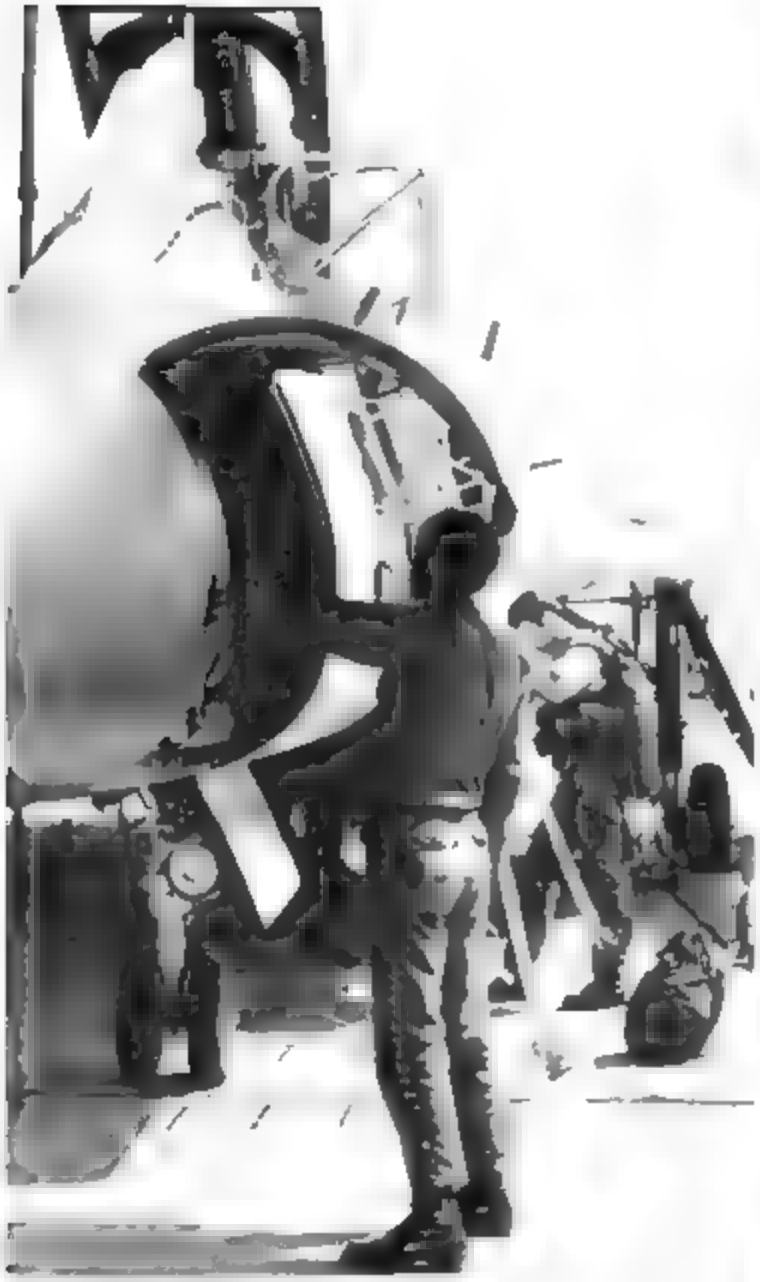
Probably the most significant modification since 1959 is installation of the M-61 Vulcan 20-mm cannon "Six-Shooter" package in the missile bay of the aircraft. It will not interfere with the Falcon missiles, which will be retained along with the gun. The only noticeable change will be a slight bulge along with centerline of the weapons bay doors where the M-61 rotating gun barrels exit the fuselage. All F-106's will soon have the gun.

The "Six-Shooter" package will also include the "Snap-Shoot" gunsight, one of the most advanced and accurate sights ever developed. This system, specially designed for the F-106, has proved to be deadly accurate in more than a hundred test firings against drone and dart airborne targets.

With this renewed interest and increased emphasis on upgrading the F-106, it will be around for many years to come. Together with an improved manned interceptor (IMI), the over-the-horizon backscatter (OTH-B) radar, and the Airborne Warning and Control System (AWACS), the F-106 will continue to provide a viable deterrent to any airborne aggressor. There are many good years left for the F-106. It is an even better interceptor today than when it entered the ADC inventory fifteen years ago.

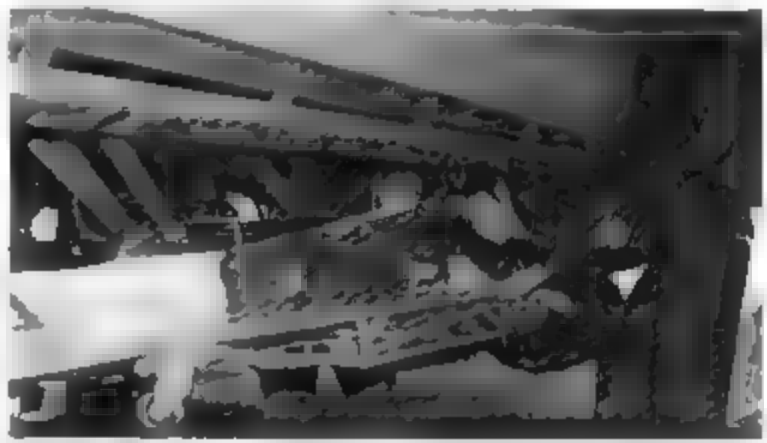
Leader of a two ship formation of F-106A's pitches out for landing at Wilmington, North Caroline's New Hannover County Airport. They are from Detachment 1, of the 48th FIS. (Jim Sullivan)

Crew Chief gives the "stop" signal to 48th FIS pilot, as he completes a mission from Homestead AFB, 1972. (USAF)



Maintanance technician makes final adjustments to the avionics equipment prior to flight. The majority of the 106 radar and nav equipment is housed in the nose section. (USAF)

Weapons loaders check the *AIR 2A Genie Rocket* and *Falcon* missiles in the weapons bay of a Six Internally carried weapons offer the advantage of .ess drag, thereby enhancing speed and range of the 106 (USAF)

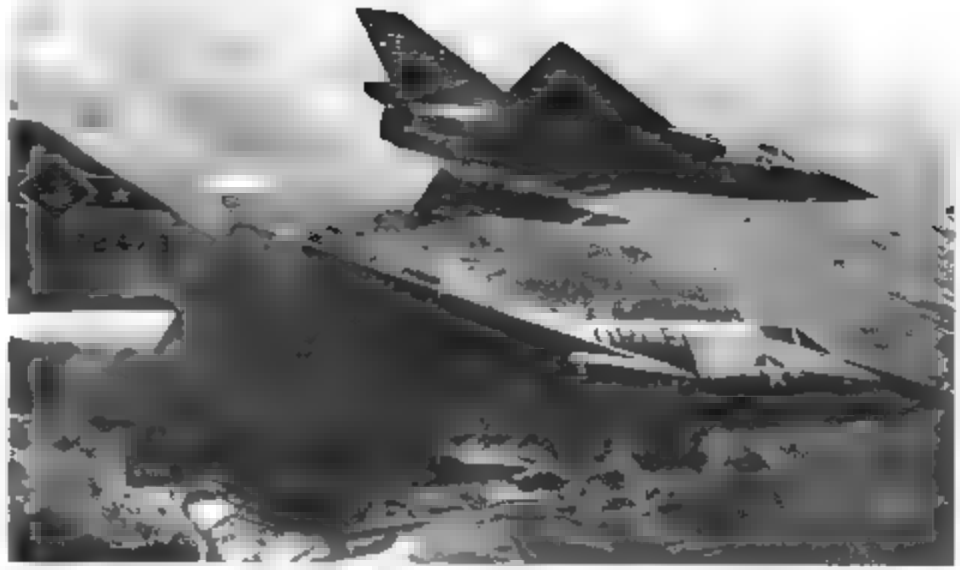


(Left) Weapons loaders install door safety locks on an actuator, which will prevent the door accidentally closing while the men are working in bay (Above) Falcon missiles are loaded on extended rail. (USAF)

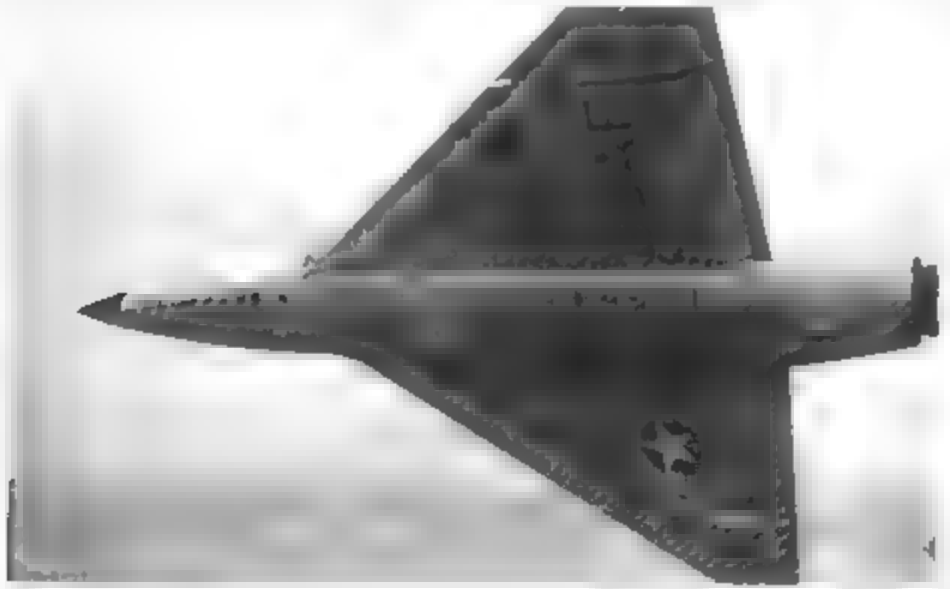
Aircraft are given periodic maintenance inspections to check major components. This *F-106* is going through such inspection and is stripped of its engine, radome and many panels. The inspection is done to insure the aircraft is standing up to the stresses and strains placed on them, and to rebuild major parts to prevent in-flight failure. (USAF)

F-106B of the Air Defense Weapons Center with two wing mounted cameras. Cameras are used for chase missions during weapons testing and mount to the same pylons as the external fuel tanks. (USAF)

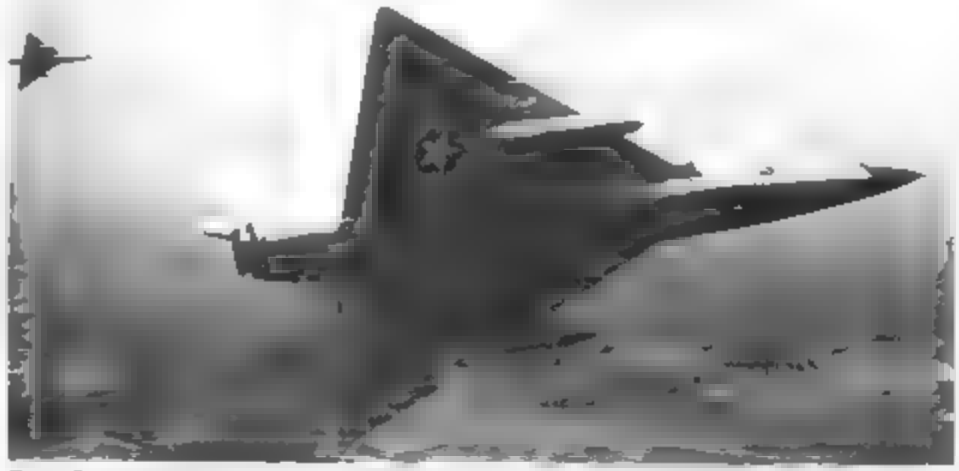
A pair of Sixes, with 230 gallon wing tanks set down for landing with speed brakes extended. The original 230 gallon tanks were subsonic and restricted the 106's to speeds under the Mach. These tanks have all been replaced with 360 gallon supersonic tanks, which can be flown at speeds to Mach 2. (USAF)



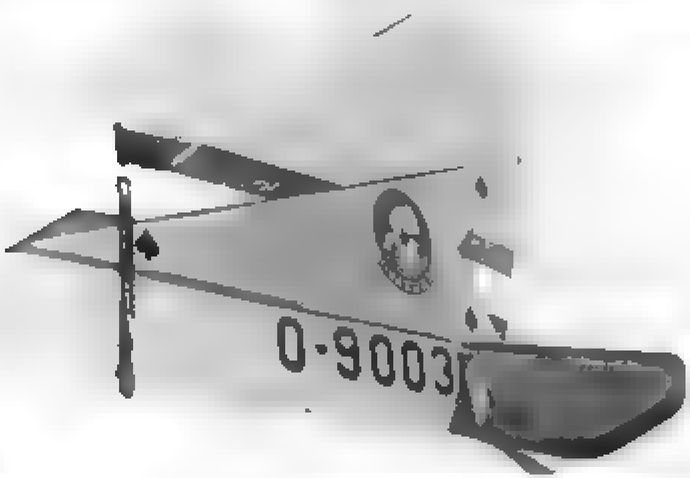
106's of the 95th FIS returning from a scramble in Korea in April 1970. The 95th was the last 106 squadron to pull alert duty in Korea during the 1968-70 buildup. The 95th returned to Dover AFB, Delaware in May 1970. (USAF)



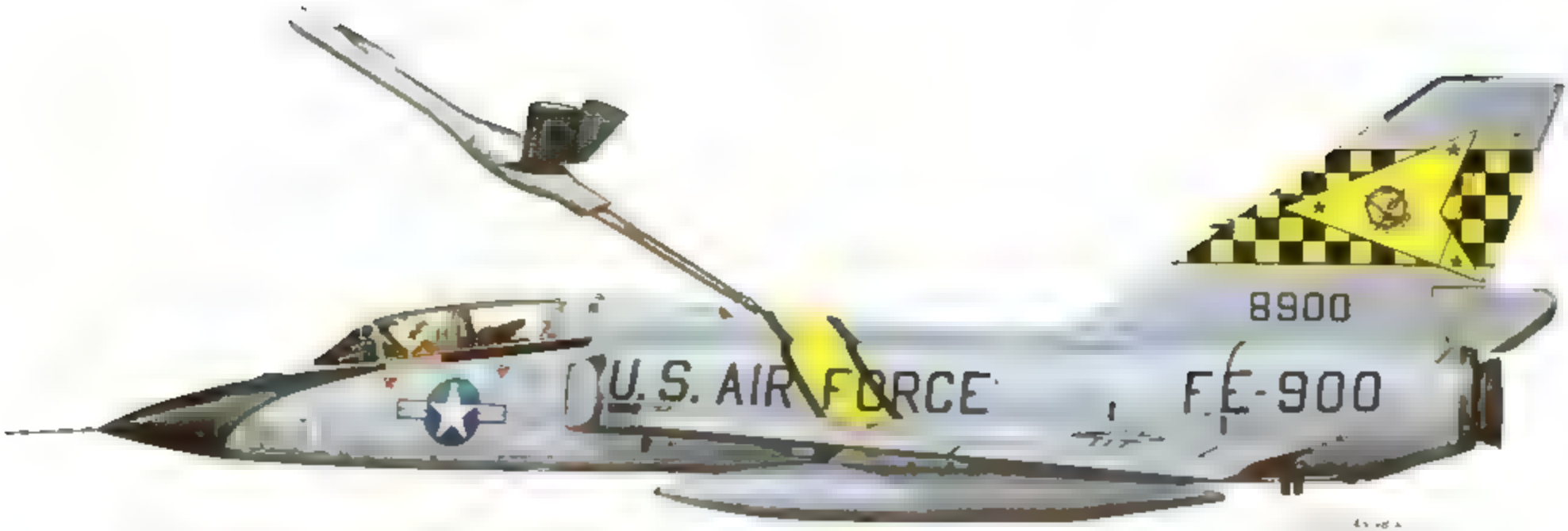
Large wing surface area is evident as a Six of the 5th FIS banks. The pitch and roll movements of the 106 are controlled by the elevons on the rear of the wings. These serve as both elevators and ailerons, hence the name "elevons" (USAF)



Two Sixes with 230 gallon drop tanks pitch out for landing. F-106's fly initial approach at 325 knots and take five second spacing during the break to gain separation for landing. (USAF)



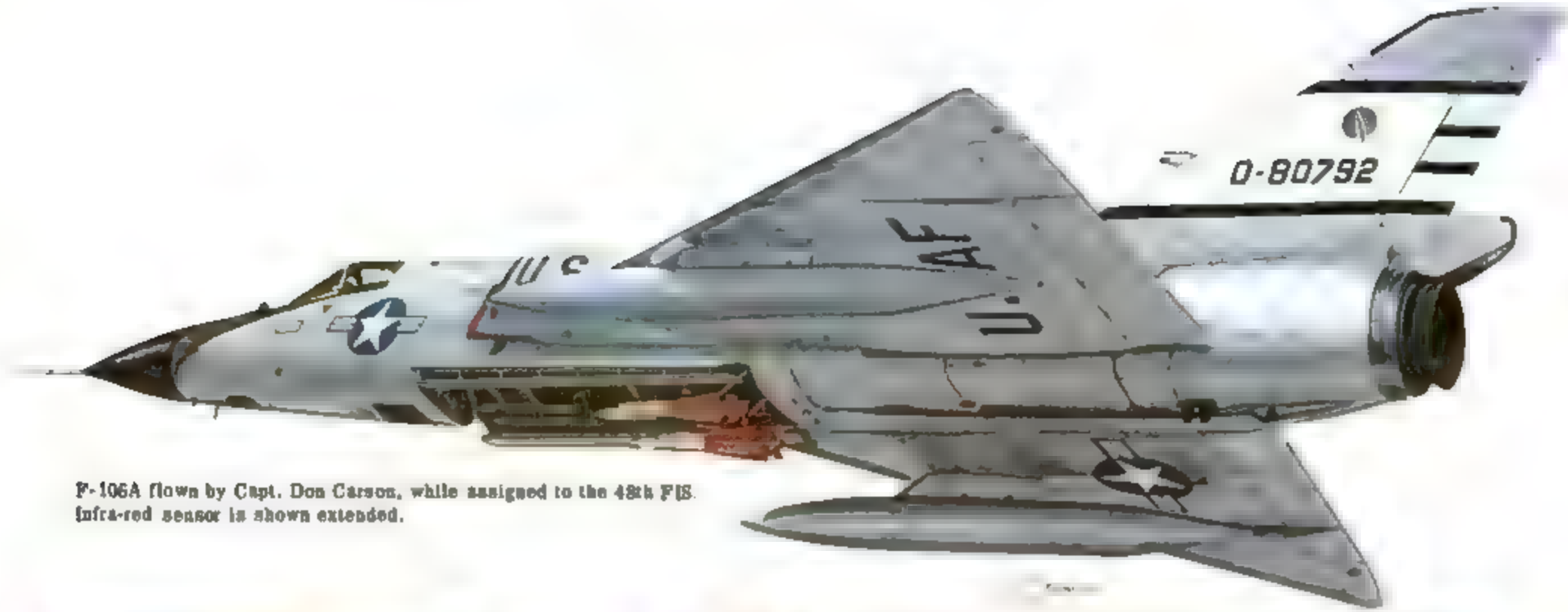
"SIX TAILS" Top left, the *318th F/S*, from McChord AFB, Washington. Middle left, the *83rd F/S*, now deactivated (it was formerly the *27th F/S*, based at Loring AFB). Bottom left the *5th F/S*, Minot AFB, N D. Top right, the *186th F/S*, Montana ANG (White lettering on a medium blue background) bottom right the *49th F/S*, Griffiss AFB, N Y (green eagle white head and feathers yellow beak and lightning flash). (Norman E Taylor)



F-106B of the 27th FIS on the Tanker. (Refer to Micro Scale sheet 72-92 for additional marking details)

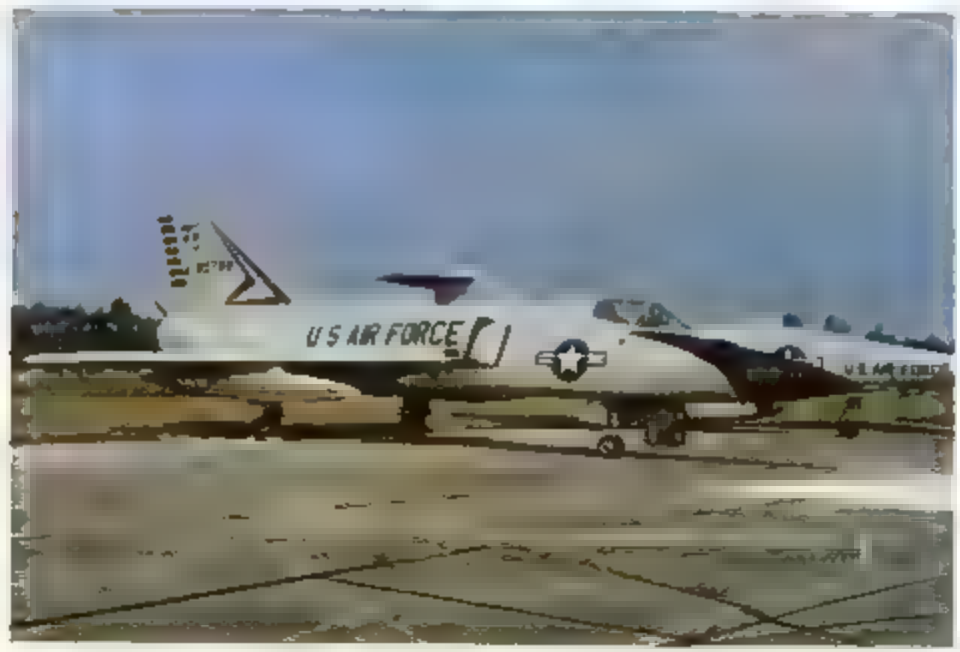
Vivid markings of early test aircraft show up remarkably against the dun coloured mid-western landscape (USAF).

Early F-106 markings carried on nose gear door of 87th FIS aircraft (See page 40)

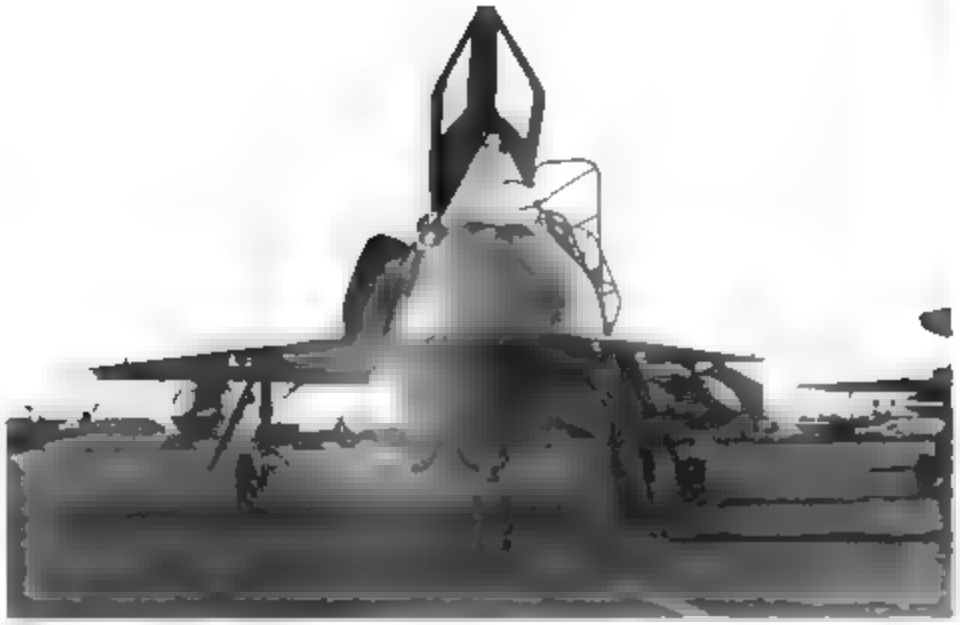


F-106A flown by Capt. Don Carson, while assigned to the 48th FIS. Infra-red sensor is shown extended.

Self portrait of Capt. Don Carson, taken as he and his wingman climb out during scramble from Homestead AFB, Florida in 1972. (Capt. Don Carson)

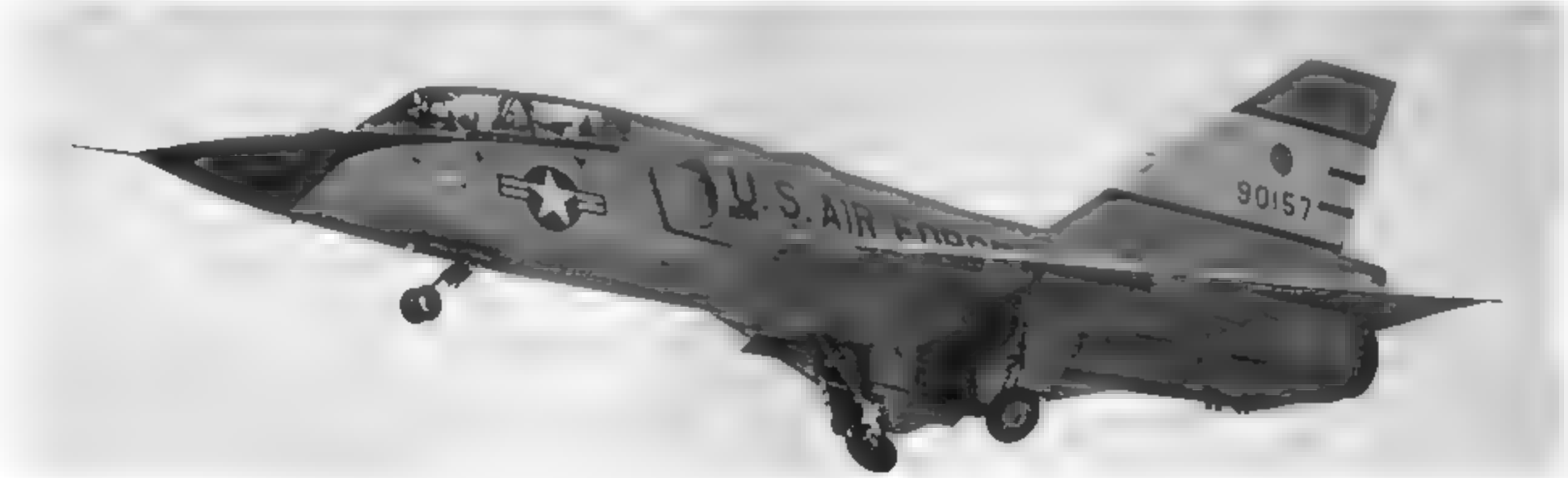


F–106A–100–CO of the 460th FIS, Grand Forks, North Dakota as it appeared during the 1972 William Tell Competition, Tyndall AFB Florida. (Norman E. Taylor)



F-106 on alert at Homestead AFB. Cables running to aircraft are for air and electric power which is used for scramble start ng. The container under the left wing is used to catch fuel which vents overboard as the aircraft warms up in the sun and the fuel expands. (USAF)

F-106 during gear retraction at takeoff. Main gear fold inward and nose gear folds forward. The J-75 engine will take the Six from brake release to 40,000 feet in approximately 3.8 minutes. (USAF)



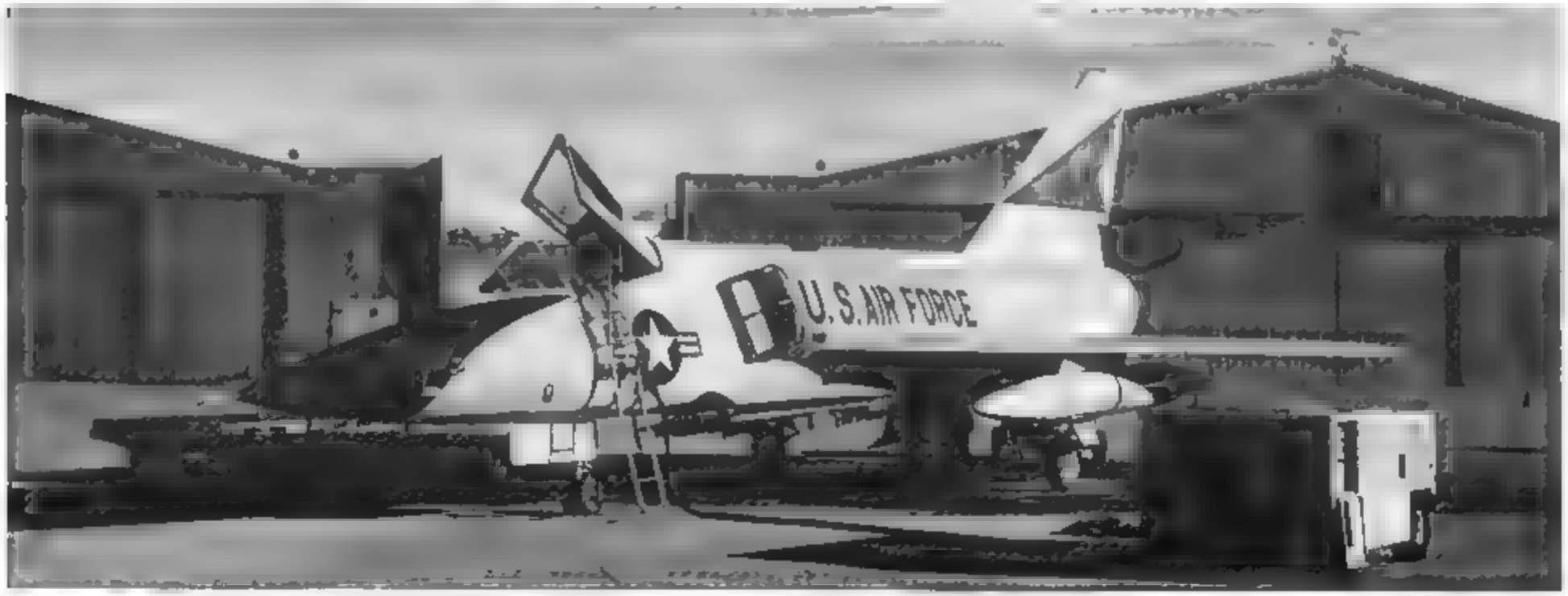
F-106B of Detachment 1, 48th FIS takes off from Wilmington, N.C. Airport. (Jim Sullivan)

F-105A of the 48th FIS lands at Wilmington, N C F-106s often operated from short runways when on NORAD alert Wilmington's runway was short and did not have an overrun To stop the 106 which lands at speeds approaching 180 knots, pilots would deploy the drag chute prior to touchdown as they crossed the end of the runway (Jim Sullivan)

A second later the aircraft settles onto the runway Note the puffs of smoke as the tire spin up to speed as they touch the pavement The pilot will hold the nose high as the Six rolls out, using the large wing area for aerodynamic braking (Jim Sullivan)

Not all landings go smoothly This is what happens when the wheels don t come down Photo taken at Castle AFB California in 1959 (USAF)

F 106 of the 456th FIS, Castle AFB, Calif replete with squadron commander's stripes behind canopy The 456th received the 106 in September 1959 and was the first squadron to fly 500 hours in the Six during one month The squadron is now deactivated (See color profile on rear cover) (USAF)



F-106 of the 71st FIS, Richards-Gebaur AFB, Missouri being prepared for weapons loading Note metal containers under nose used to house missiles while in storage. Screens over engine intakes are to prevent foreign objects from being sucked into engine during ground runup. (Norman E. Taylor)

F-106A of 539th FIS, L.G. Hanscom Field, Mass., 1965. The name of the pilot on the nose is "Capt. Don Windrath", now commander of the 48th FIS, and a Lt. Col. (Thomas S. Cuddy II via Paul Stevens)

539th FIS, McGuire AFB, N.J. (note variation in markings from photo at left) was the second squadron to become equipped with the F-106. The 539th is now deactivated. (USAF)

Six of the 87th FIS. The 87th later adopted the distinctive "Red Bull" tail insignia. (See front cover.) (Paul Stevens)

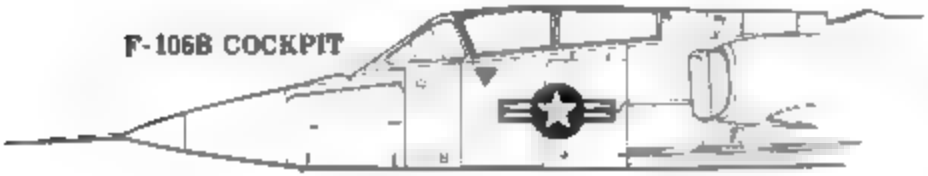
Six of the 2nd FIS, Wurtsmith AFB, 1972. The 2nd FIS has since been deactivated. (Paul Stevens)

Sixes often served in more than one squadron during their operational lifetimes. This F-106-100-CO is shown in the markings of the 94th FIS in 1960, and in the livery of the 460th FIS in 1972. (Norman E. Taylor and David W. Menard)

F-106A 125-CO of the 11th FIS (now the 87th FIS) in an alert hangar. Aircraft on Air Defense Alert are set up for flight prior to being placed on alert. They can be airborne within minutes of receiving a scramble. (Douglas D. Olson, via Paul Stevens)

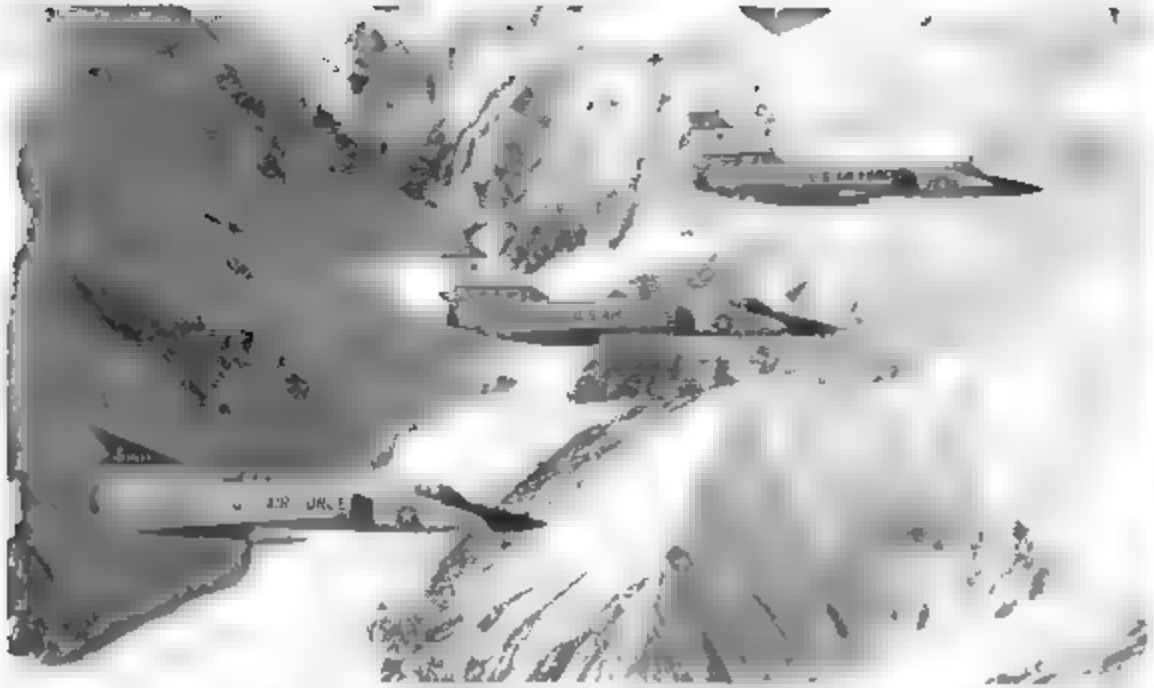
F 106A-90-CO of the 95th FIS, Dover AFB, Del. in May 1965. The distinctive "Mr Bones" insignia has been retained, but diminished in size on later squadron aircraft (Ray Ruhe via Norman E. Taylor)

F 106A-110-CO of the 27th FIS, Loring AFB, Maine, on the Elmendorf AFB, Alaska flight line during Alaskan deployment (Norman E. Taylor)



F-106B of the 11th FIS at Duluth AFB, Minnesota in May, 1962. Note the 230 gallon drop tanks. (Charles B Mayer)

A pair of Sixes, of the 71st FIS, Richards-Gebaur AFB, Missouri, in low level formation (USAF)



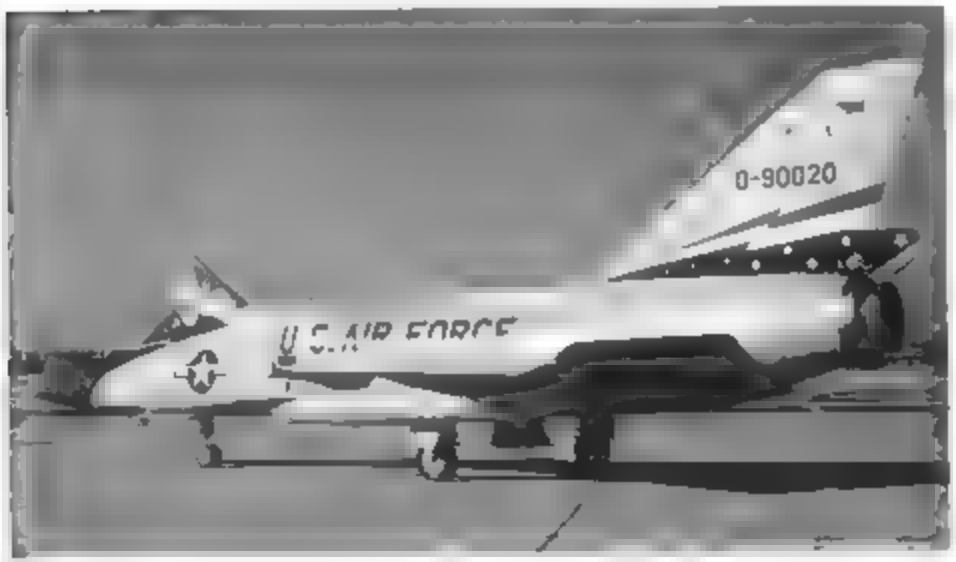
A pair of Sixes from the 48th FIS, and a lone F-106 from the 11th FIS fly by Mt McKinley, Alaska on 15 April, 1969. F-106's stood NORAD air defense alert in Alaska from 15 June, 1963 until 30 September 1970. Two squadrons at a time would maintain a portion of their aircraft on alert in Alaska on rotational duty. (George Holland via Norman E. Taylor)

F-106A and *B* models of the 48th FIS over Tidewater, Virginia (USAF)

Contrast in aircraft and flight gear is evident as Major Jerry Hurst, and his *F-106* pose with Mr Joe Hitch and a restored *Stearman* on the McClellan AFB flight line in 1973. (USAF)

F-106 of the 48th FIS poses next to *Air Force One* on the Homestead AFB flight line in 1972. (USAF)

Red white and blue tail flash adorns the tail of this F-106A-135-CO of the 84th FIS. Hamilton AFB Calif Photo taken at Kelly AFB Texas in December, 1972. (Norman E. Taylor)

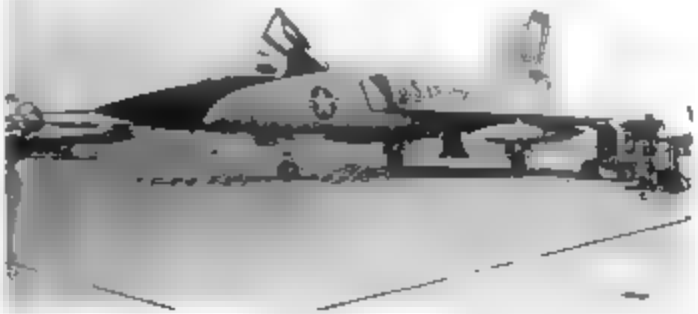


F-106A-105-CO of the 84th FIS taxies out at Kelly AFB Texas, Jan. 1973. The 84th has relocated at Oxnard AFB, California. (Norman E. Taylor)

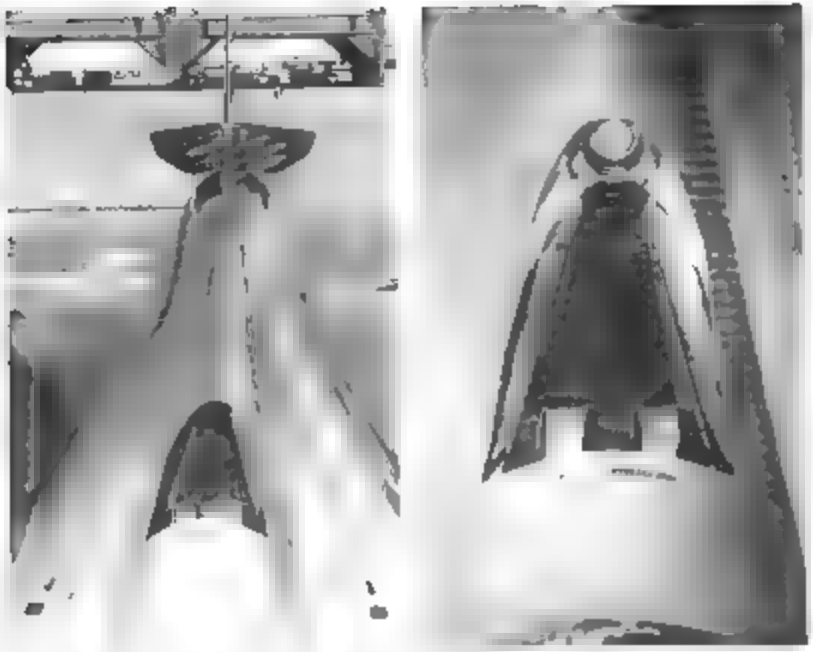
F 106A-120-CO of the 49th FIS. Lightning flash on fuel tank is yellow, with black outline. Nose flash is white, with green outline. (Norman E. Taylor)

F-106A-75-CO of the 186th FIS, Montana ANG on the flight line at Kelly AFB, Texas in December 1972. (Norman E Taylor)

The Montana ANG flies the F-106 out of Great Falls, Montana. (USAF)

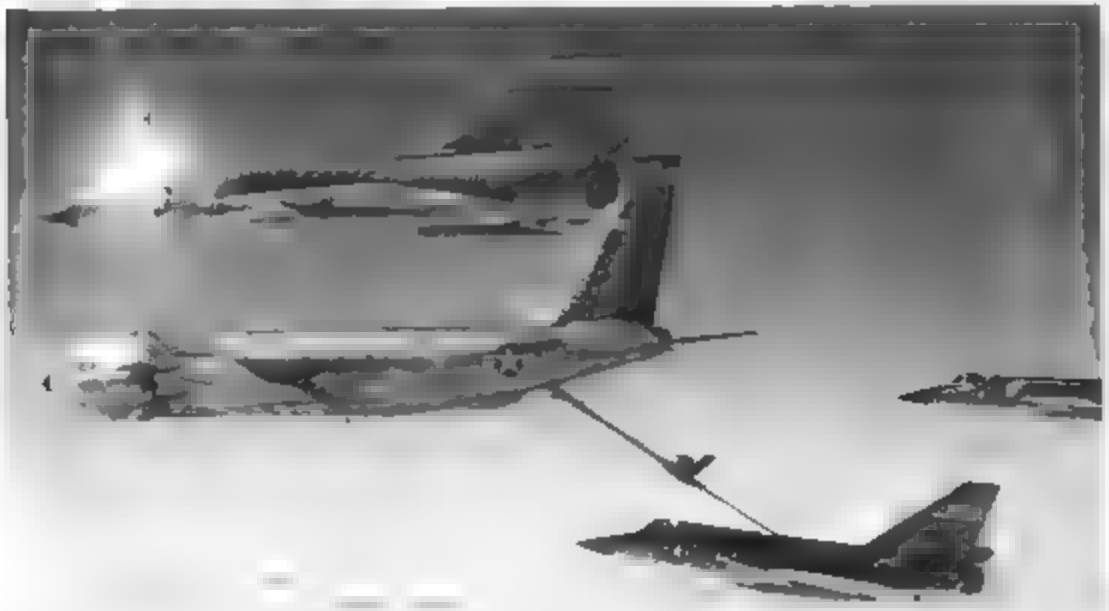


F 106A 120-CO of the 49th FIS, Griffiss AFB, N Y., on the McConnell AFB flight line, July, 1970 (Charles B Mayer)

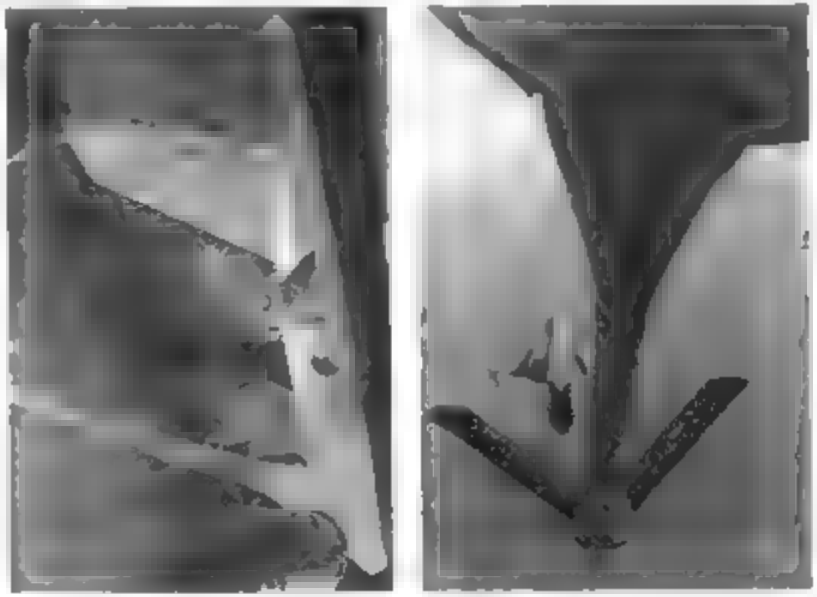


Aerial refueling area on saddleback of the 106, with the slipway door closed (left) and open (right) (USAF)

"B" model waits for clearance into the pre-contact position to take on fuel from a KC-135 tanker. The air refueling modification was begun in August 1967. The first squadrons to receive the mod were the 71st and 318th FIS. (USAF)



Six of the famous 94th FIS takes on fuel enroute to Korea. *F 106's* of the 94th made the flight to Korea on 17 June, 1969, and returned after six months of alert duty, on 15 November 1969



View from the rear seat of a "B" as the pilot slides into the pre-contact position. (Right) "Boomer's" view of a Dart about to make contact on the tanker. (USAF)

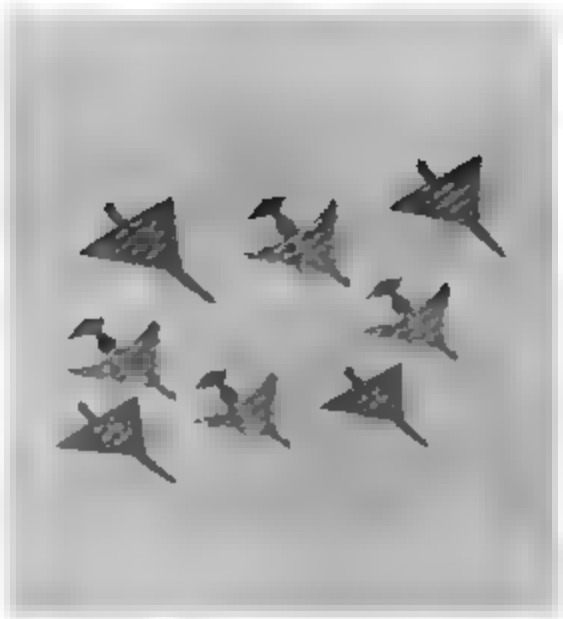
95th FIS *F-106*'s on alert in Korea in 1968. Tail and fuel tank markings are medium blue with gold trim. (USAF)

Lt. Gen. Arthur Agan, then commander of ADC, is greeted by an *F-106* loaded with 500 lb. bombs as he visits the 48th FIS on alert in Korea in 1968. The Six was not used as a bomber . . . this was an elaborate practical joke played on the General by 48th troops. (USAF)

Darts of the 318th FIS on alert in Korea in 1968

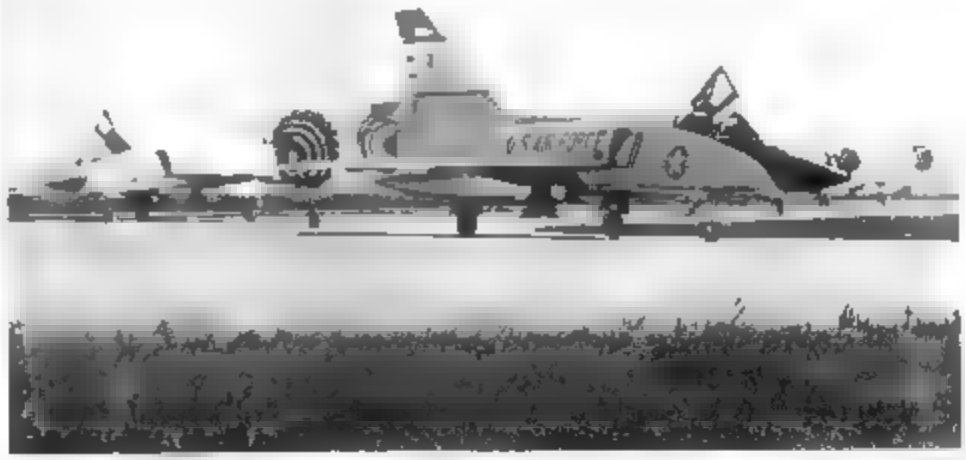
F-106's of the 95th FIS taxi back to revetments at Osan AB, Korea, 1969. (USAF)

F-106 of the 460th FIS leads a Six of the Air Defense Weapons Center, and a pair of TAC *F-4E*'s back from an aerial combat training mission at Tyndall AFB, Florida. (USAF)



Gaggle of Sixes and F-4's return from ACT mission at Nellis AFB, Nevada in 1968. Note the difference in wing area between the two fighters (USAF)

Pilots of the 48th FIS and Navy Fighter Squadron VF-21 hold informal debrief on the ramp at NAS Oceana, after an ACT mission in 1972. (USAF)

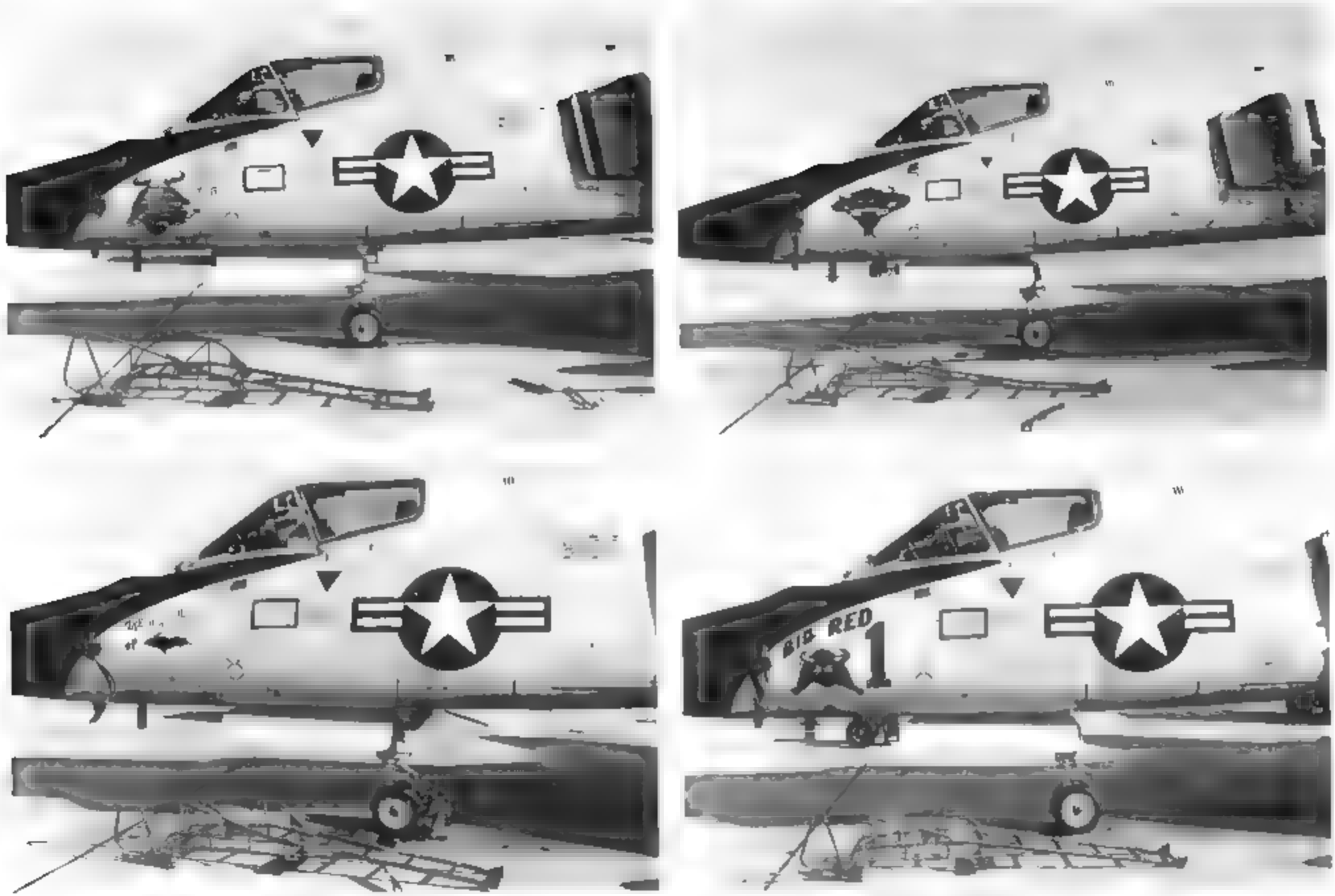


48th FIS *F* 106's taxi to the ramp after an ACT mission with Navy F-4J's. (USAF)

F-106 of the 48th FIS and two Navy *F-4J*'s of VF-21 return from an ACT mission over the Atlantic Ocean off the coast of North Carolina. (USAF)

"B" model of the Six, in markings of Air Defense Weapons Center, at Tyndall AFB, Fla., 1973. (Lou Drendel)

F-106B of the ADWC flies over Panama City, Florida. Blue and white stripes behind the canopy indicate that this is the Wing Commander's aircraft. (USAF)



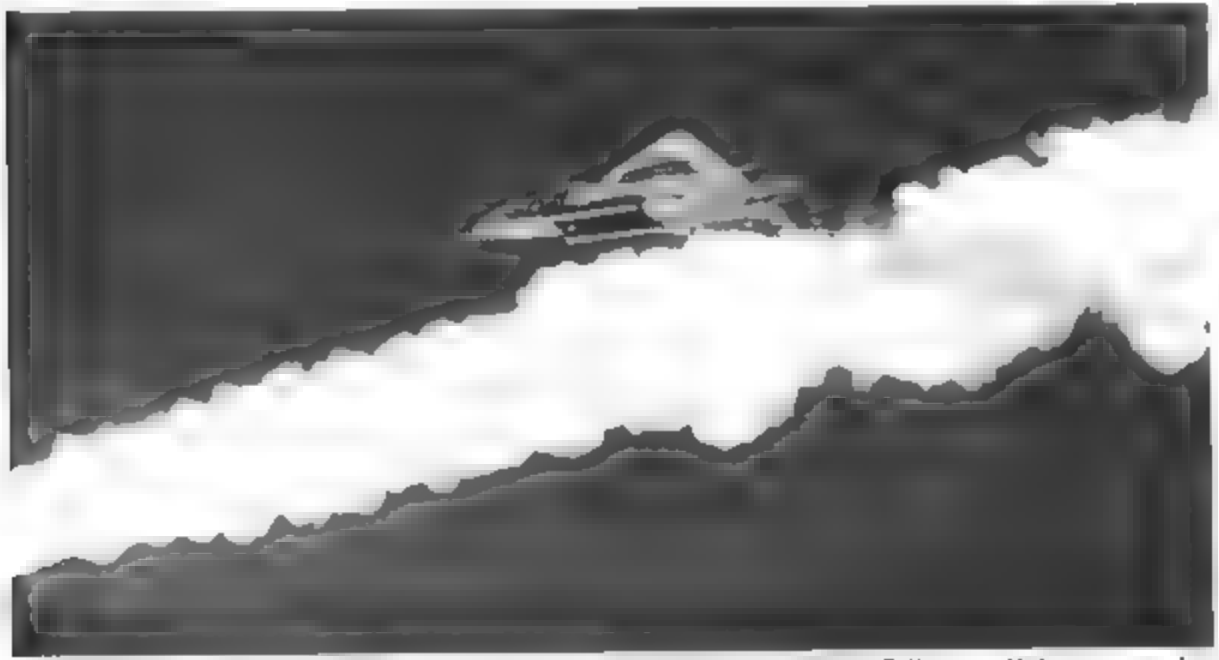
Colorfully marked *F-106's* of the 87th FIS as they appeared at the 1972 William Tell Meet at Tyndall AFB, Florida. Imaginative artist who decorated 87th Darts is Captain Dick Stultz. For further markings details, refer to Micro Scale decal sheet #72-115. (Norman E Taylor)

Team leader and squadron commander of the 87th FIS "Red Bulls", Lt. Col. Tom Wotring taxies to his parking space during 1972 William Tell weapons meet. (USAF)

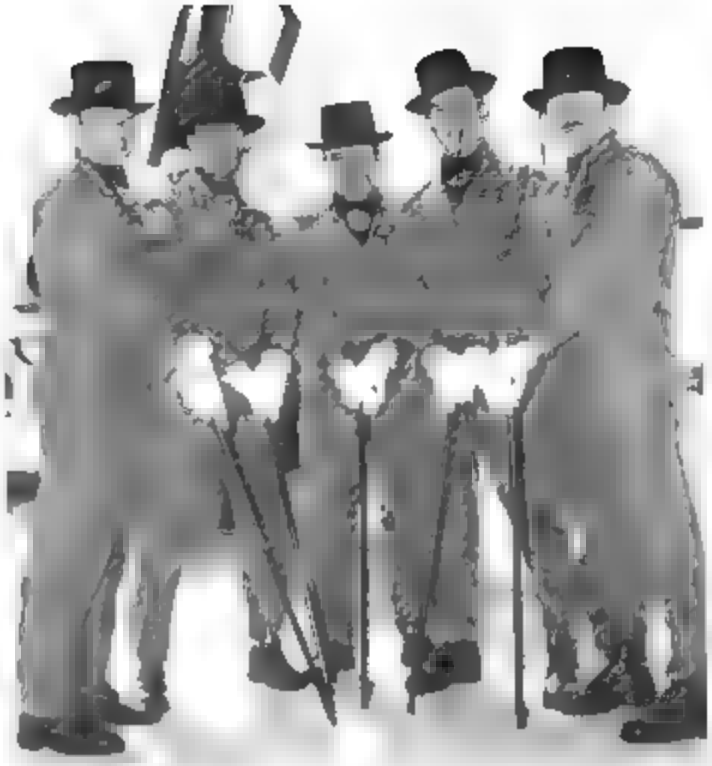
Another of Dick Stultz' masterpieces, "Jack the Gripper" on *F-106* #80098. (USAF)

F 106A 125 CO of the 87th FIS out of K I Sawyer AFB, Michigan photographed at Kelly AFB, Tex Feb. 1973. (Norman E Taylor)

F 106 of the 5th FIS with distinctive yellow and blue markings, photographed during William Tell '72 (USAF)



AIR 2A Genie rocket streaks away from a Six of the 5th FIS during William Tell meet. Note weapons bay doors still in the open position. (USAF)



Top hats and canes were the uniform of the day for 95th FIS participants in the 1972 edition of William Tell. (USAF)

460th FIS pilots at William Tell '72 (USAF)

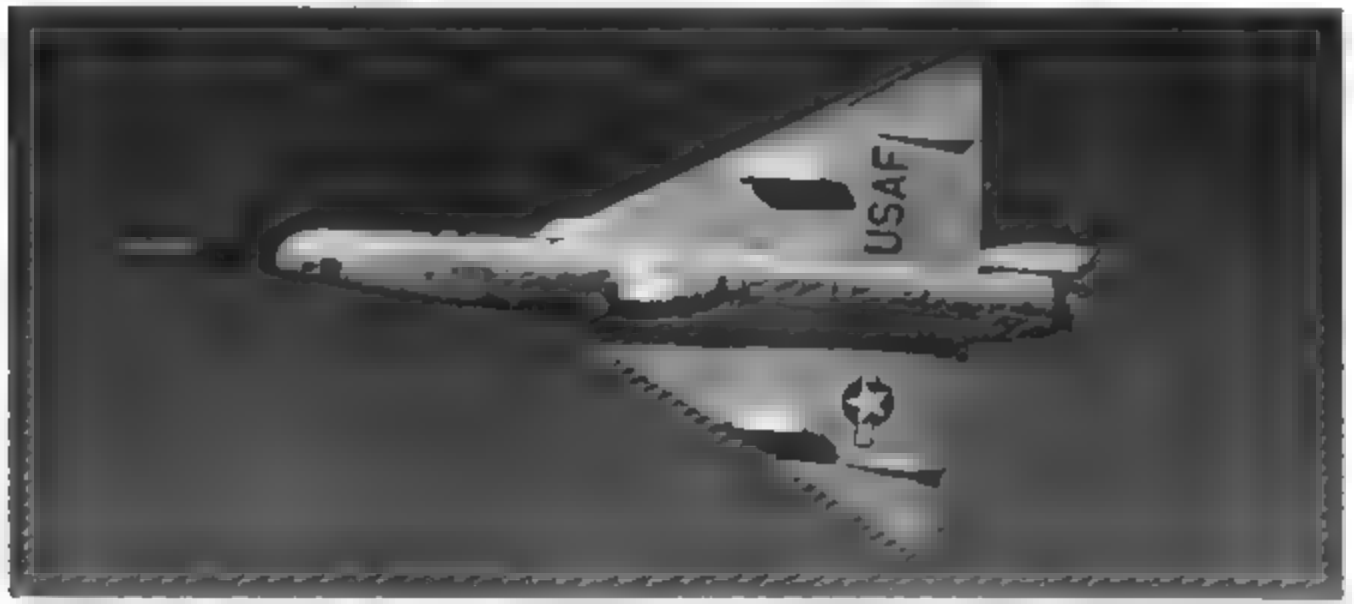
Preparing to load *Falcons* on a Six of the 84th FIS (USAF)

Weapons loaders carry a *Hughes Falcon* missile during weapons loading competition at 72 William Tell. Sixes carry four Falcons, and one *Genie* nuclear capable rocket (USAF)

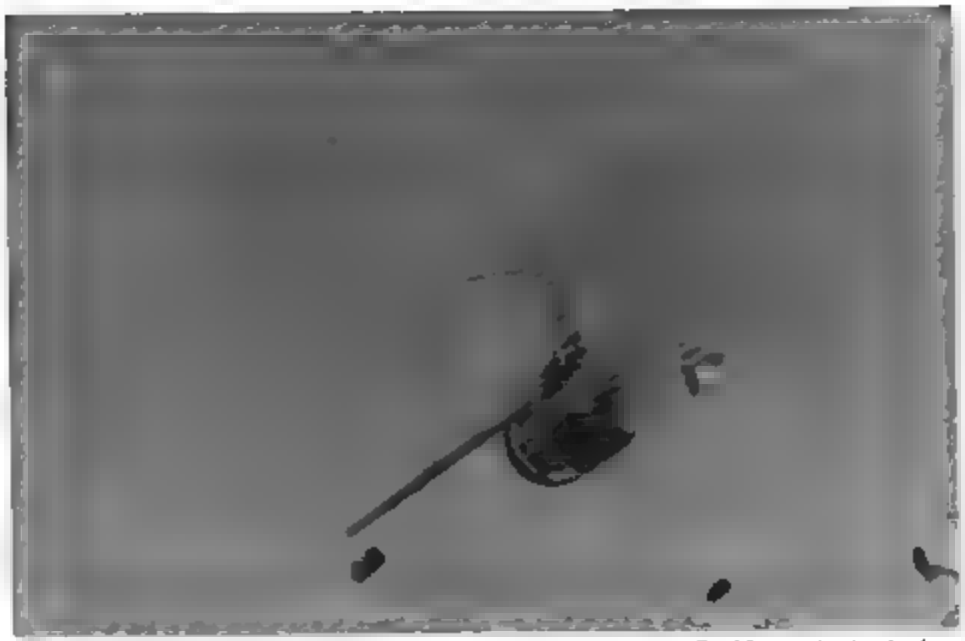
F-106's of the 318th, 2nd, 87th, and 5th FIS' on the ramp at Tyndall during the 1972 William Tell Meet (Norman E. Taylor)

F-106A-100-CO of the Air Defense Weapons Center which served as the test bed aircraft for the Vulcan cannon modification and clear top canopy. See color profile on rear page for colors. (USAF)

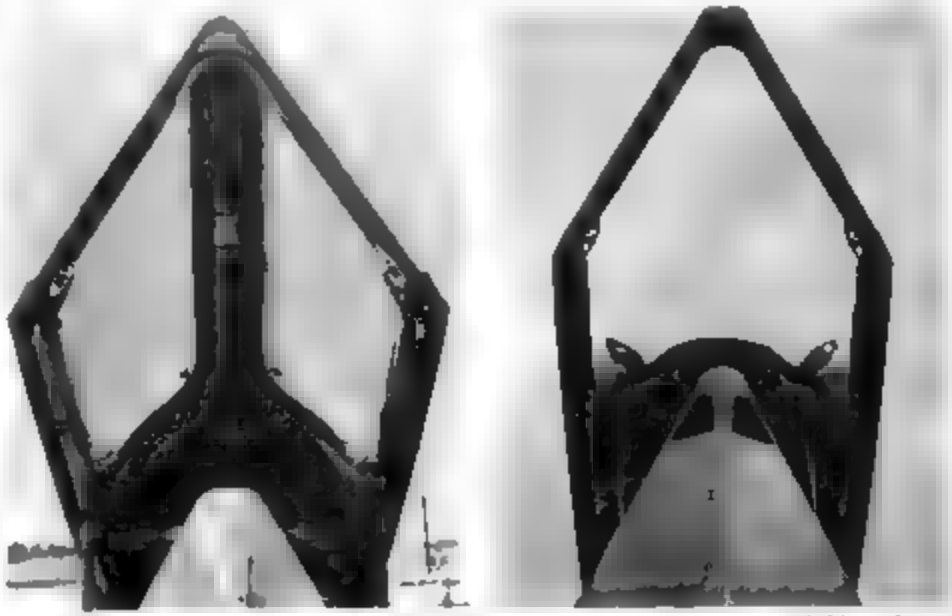
Additional views of #785 and its pilot Major John Manter. On the photos at left, note the air scoops on the left side of the fuselage and just ahead of the refueling port, which are used to purge gases from the gun when it is fired. The silhouettes stencilled on the nose indicate "kills" of drones made with the gun. These were the first drone kills ever made by a fighter with a gun. (USAF)



Major Mantel, who acted as project officer for the gun modification, checks the gun prior to flight in which he downed one of two drones with the "Six Shooter", in August 1972 (USAF)



Mace missile being destroyed by 20mm cannon during early F-106 gun test mission (USAF)



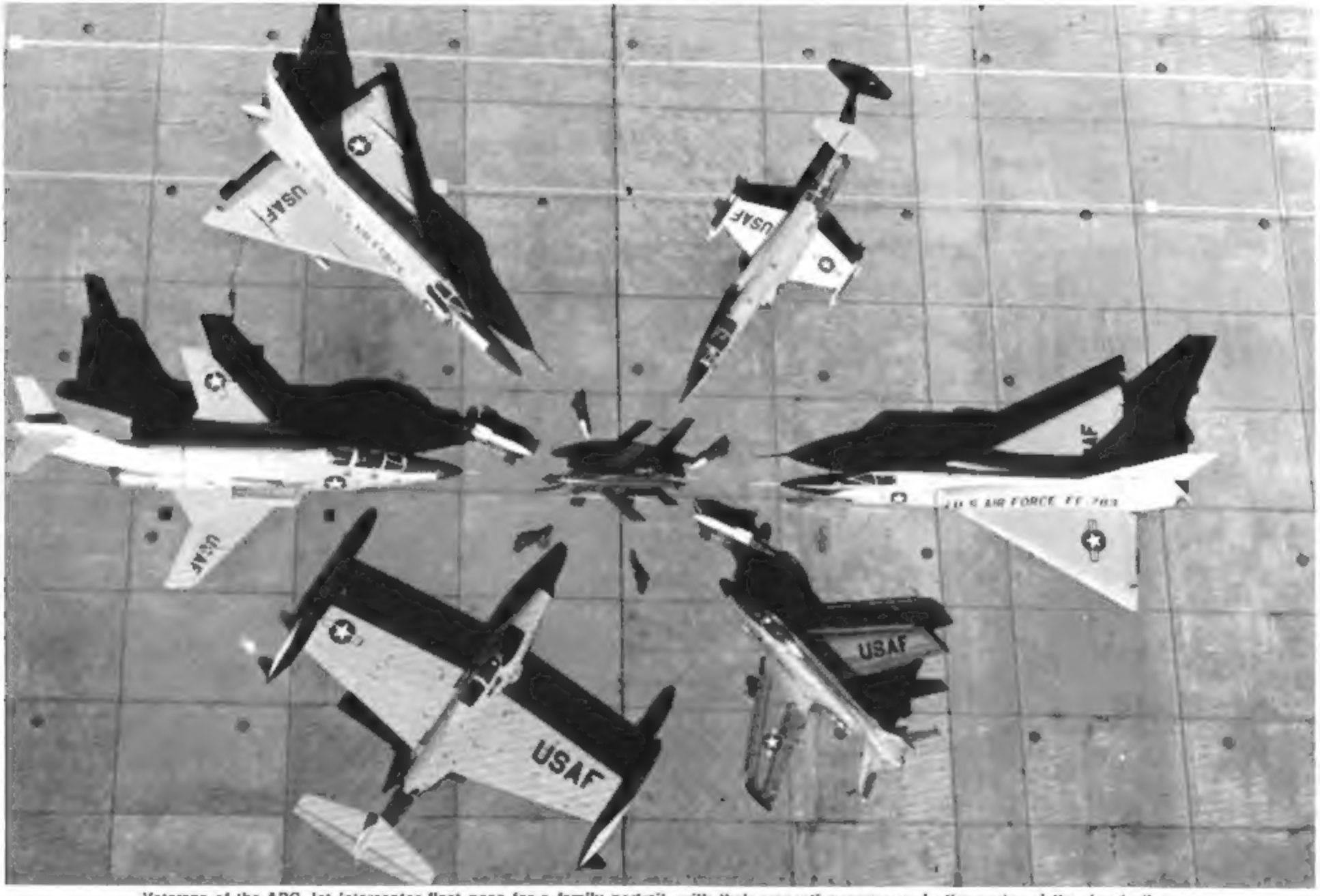
Improvement in overhead visibility is evident in comparison of old (left) and new (right) canopies of the F-106. (USAF)

All F-106A's received the new clear top canopy in 1972. (USAF)

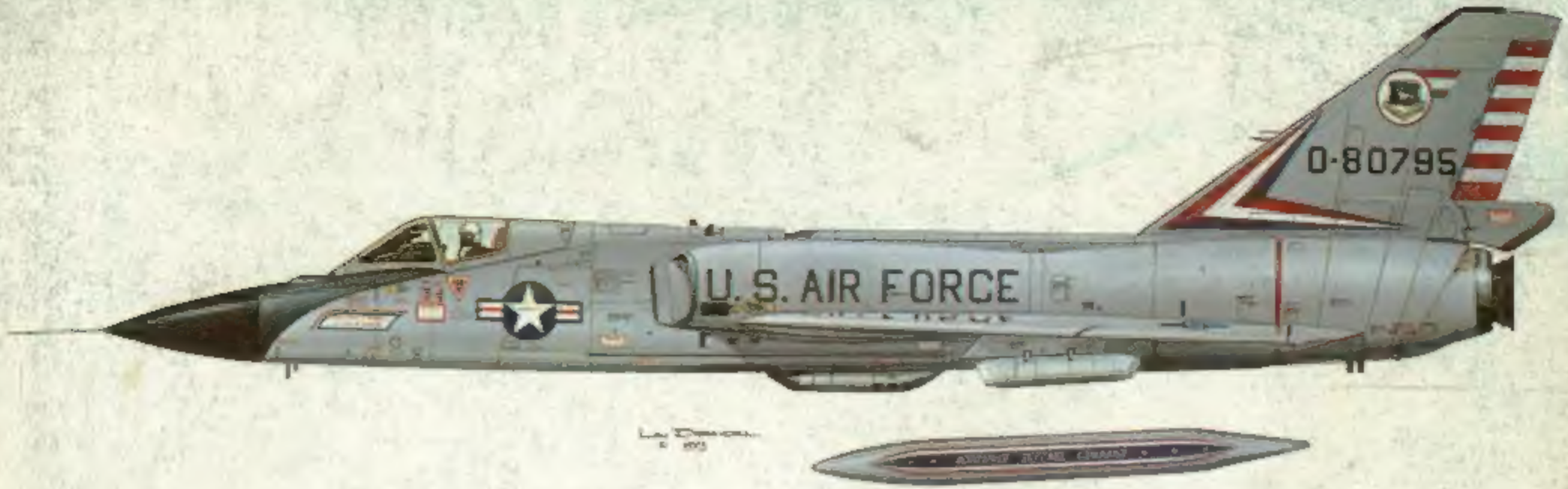
Left wingman executes a pull-up in the missing man formation in honor of Viet Nam P.O.W.'s during Hughes trophy ceremonies at Langley AFB, Virginia. (U.S.A.F.)

With its afterburner lit, a Dart of the 48th roars off the runway at Langley AFB. (USAF)

The 48th FIS won the 1972 Hughes trophy, which is awarded annually to the finest Air Defense Squadron in the United States Air Force by the Hughes Aircraft Company. (Jim Sullivan)



Veterans of the ADC Jet interceptor fleet pose for a family portrait, with their respective weapons. In the center of the ring is the Firebee drone aerial target. Of the six different types of fighters shown, only the *F-106* remains in the active ADC inventory as an interceptor. (USAF)



F-106A-100-CO 58-0795 of the Air Defense Weapons Center, Tyndall AFB, Florida. This was the test bed aircraft for the new clear top canopy and Vulcan Gun Pod. It is shown with camera pods on the wing stations. (Also shown are the colorfully marked wing tanks) It was flown by Major John Mantei. Note 'kill' marks under canopy which attest to the deadly accuracy of the Vulcan cannon.

F-106A-135-CO 59-0142 of the 456th FIS, 1953. Pilot was Capt. B.B. Patterson, C.C. was S/Sgt Josephson.

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